Chemical Age

U.K. TRENDS IN FERTILISER USAGE
(page 531)

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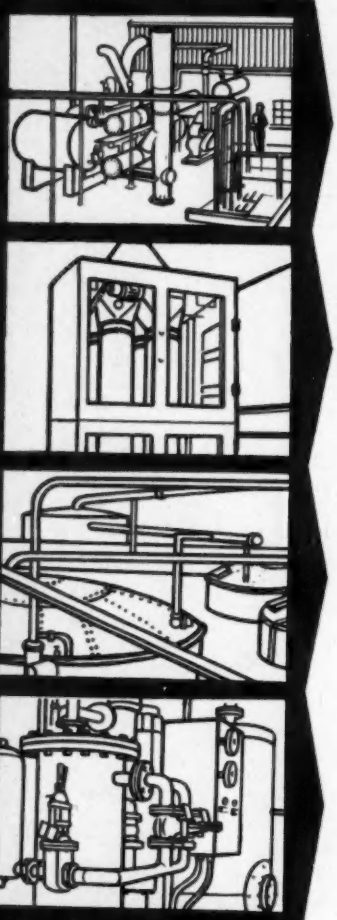

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INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

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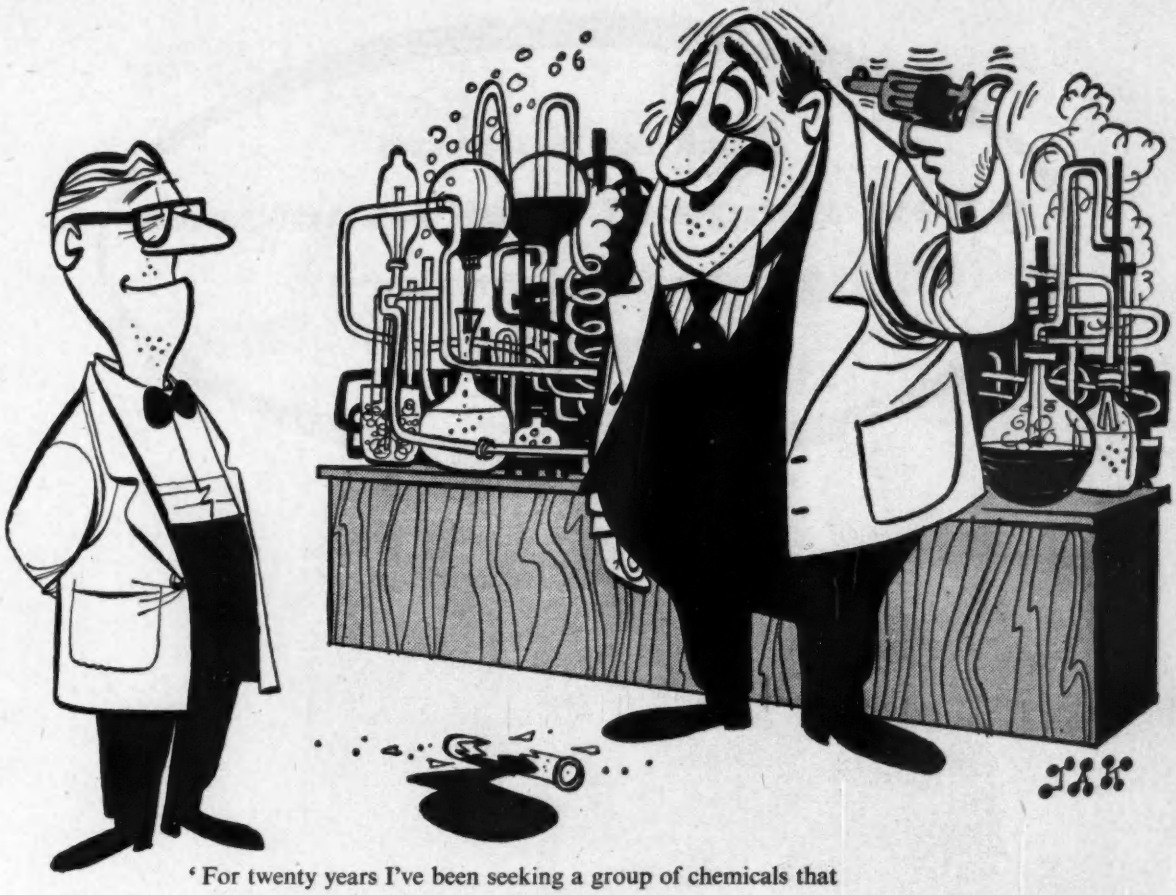

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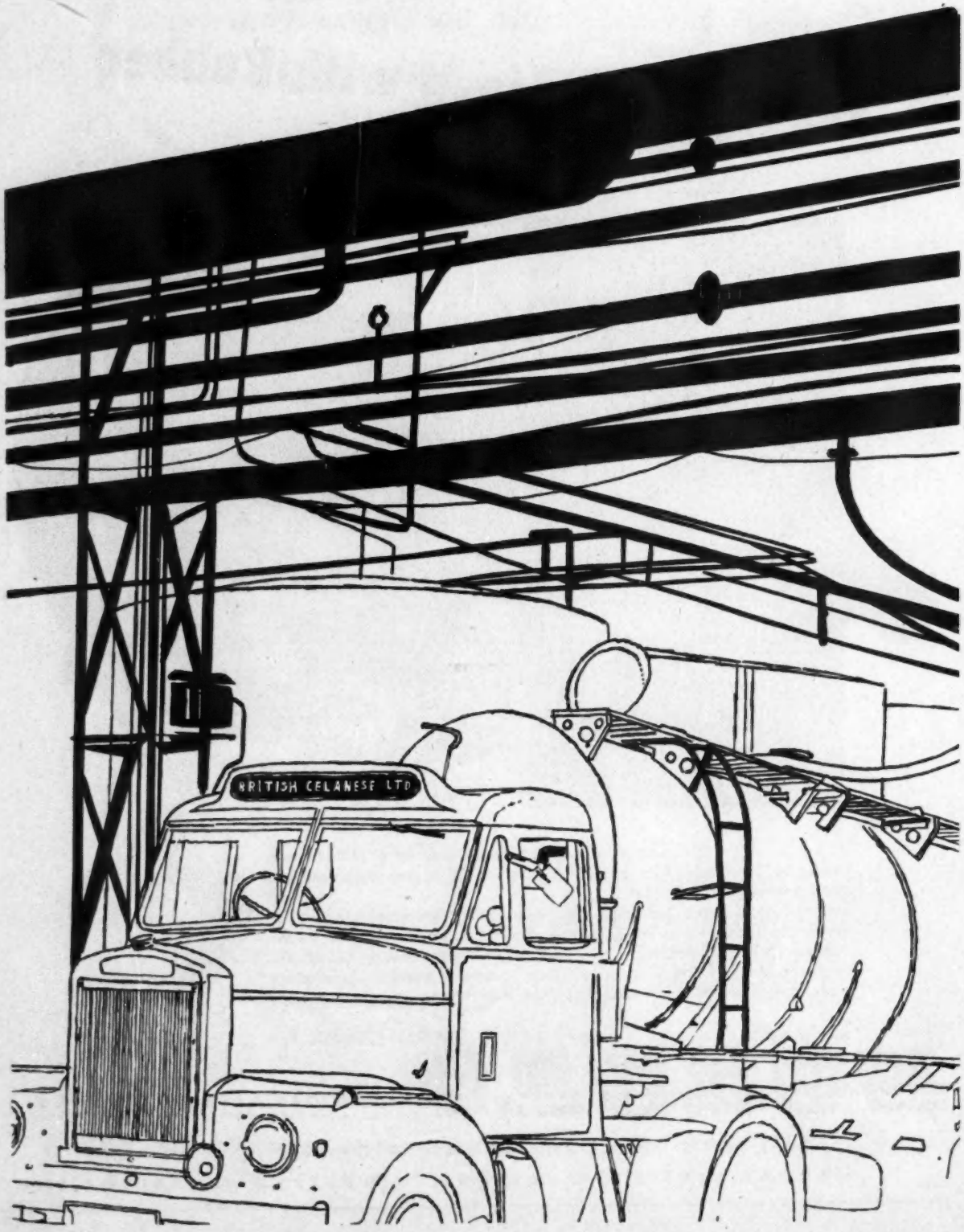

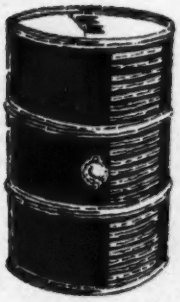

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IN THIS ISSUE

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FERTILISERS AND SUBSIDIES

BRITISH fertiliser industry is destined for a period of harsh criticism and this despite the findings of the recently published Monopolies Commission's report on the supply of fertiliser chemicals (CHEMICAL AGE, 20 February, pp. 316-319). The value of products of the industry is about £100 million a year, so fertiliser costs must perforce come under close scrutiny.

Last week Parliament debated agricultural and food grants and subsidies (CHEMICAL AGE, 19 March, p. 497). Of the largest production grant requirements for which more money is required, are £1 million for the fertiliser subsidy and £1.25 million for the lime subsidy. The start of this fertiliser year has seen an exceptionally high use by farmers of both fertilisers and lime, which is a good thing for the fertility of the land. This high usage of agricultural chemicals is considered to be due partly to the good weather conditions, especially for liming and partly to the greater use resulting from price reductions for most fertilisers since last July. Hence fertiliser consumption is likely to be a record and lime deliveries to exceed 7 million tons as against an average of 6.2 millions in the three previous years.

In considering the question of the fertiliser grant the present request is for an extra £2.25 million this year in respect of fertilisers and lime. The subsidies for these products have increased greatly during the last few years. In 1951-52 it was of the order of £8 million and two years ago when the same motion was debated it had risen to £34 million. Since then it has been increased by another £6 million—a total grant of £40 million to support fertiliser and lime prices. The lime subsidy provides between 60% and 70% of the price and the fertilisers subsidy about 45% of the price.

No one will deny that the purpose of the subsidy, to encourage the greater use of fertilisers in the U.K., is a good one. But obviously it must be asked, as did one Parliamentary member, whether such a purpose requires the expenditure of £40 million, or whether there are other ways in which the money could be put to better use, or even whether the money is serving its purpose.

In the U.K. the farmer lags behind most of his West European counterparts in the use of fertilisers, as well as in respect of the rate of increase in their use. The Fertiliser Manufacturers' Association's recent report (see p. 531) confirms this. West Germany, which also subsidises fertilisers, although more modestly than the U.K., uses twice as much nitrogen and more than twice as much potash as the U.K. does, and 40% more phosphates. Also, in the comparable two-year period since 1958, the use of nitrogen in West Germany has increased by six times as much as it has in this country, and the use of potash by more than three times, and whereas the use of phosphates has decreased in the U.K. it has increased by 25% in West Germany. The position, in so far as this country is concerned, is therefore not satisfactory.

The Monopolies Commission's report now being carefully studied by fertiliser manufacturers and Parliament, has yet to be debated. It shows,

however, that the position is a difficult one, for this country has tariff-protected and subsidised 'monopolies' and one question which the report did not embrace is that of the restrictive price agreement in connection with sulphate of ammonia. Some therefore feel that all things considered, British nitrogen industry has been unenterprising, in spite of the support of the subsidy.

Another criticism voiced recently is regarding costings procedure for fertilisers. There is a costings procedure for lime, but not for fertilisers. In Parliament Mr. F. Willey (Lab., Sunderland, North), suggested that in the case of fertilisers the fertiliser producers were different—i.e. they were big monopoly producers, and hence the Government could not stand up to them as they could to the smaller lime producers. If as is the case, the Government is providing by subsidies between 30 and 45% and in one instance over 50% of the price, it is entitled to the assurance that prices are fair and reasonable.

As was indicated at the time of the Monopolies report, Fisons, the company under greatest fire because of their earlier profits of 20% on historic cost, have during the last few years steadily reduced prices and last year, U.K. fertiliser manufacturers reduced their prices by £2.6 million. With new plants now operating economically, the fertiliser industry can be expected to go ahead, and to continue to reduce prices. This should mean also that the subsidy to farmers could be reduced. A possibility which might be borne in mind is that as 70% to 80% of the fertilisers come mainly from two companies—Imperial Chemical Industries Ltd. and Fisons Ltd.—the Government might find some way of paying the subsidies at source and thus save administrative work and money as well.

Confusing the issue somewhat is that although there is a subsidy for nitrogenous fertilisers and one for phosphatic fertilisers, there is no subsidy for potash. Yet farmers are using increasing amounts of all three. This suggests that the farmer is using more fertiliser not because of the subsidy alone, but because of the advisory service provided by I.C.I. and Fisons on fertiliser use. The question this raises is whether the increasing use of fertilisers would continue without the subsidies.

A further problem is the duty on nitrogenous fertilisers and hence the necessarily higher subsidy. The present price to farmers of sulphate of ammonia is considerably higher than prevailing world prices and there is an import duty on nitrogenous fertilisers including sulphate of ammonia. The President of the Board of Trade, Mr. F. J. Erroll, has been asked, therefore, if he will remove the duty and so enable the subsidy to be reduced and at the same time enable some competition to be introduced into the fertiliser industry. Under examination is the import duty on sulphate of ammonia (CHEMICAL AGE, 19 March, p: 497), but as things stand at present the U.K. fertiliser industry which can be regarded as being in a monopoly position, is therefore being supported both by a tariff and a subsidy. It is believed, however, that the industry is well aware of these anomalies and is now reorganising itself. The new economic plants in production should do much to help reduce fertiliser costs.

U.S. POLYPROPYLENE

INTEREST in polypropylene in the U.S. shows no sign of flagging. In fact, just the reverse, for still more companies are announcing plans to enter the field or to expand existing capacity or capacity which is only now in the course of being set up (see page 538). U.S. chemical industry still retains its optimistic view of this new plastics material despite the uncertainty regarding market outlets for films, fibres and moulded products. How else can the large capacity plants now under construction by some half a dozen large U.S. plastics producers, and the obviously firm intentions of as many more, be explained?

It is widely believed in the U.S. that more information regarding the potential of polypropylene will be available this year. This is obvious from the present approach in the U.S with one or two producers with firm plans for expansion, others building moderately sized plants with possibilities of expansion and others at this stage just sitting on the fence.

As things stand at present, the U.S. will have a considerable overcapacity problem in polypropylene and if plans for new plants continue as indicated then ever greater overcapacity can be expected. Cautious observers point to the situation that developed with low-pressure polythene in the U.S. Company after company jumped onto the "polythene band-waggon" before the market potential of the product had been completely gauged so that overcapacity resulted. In fact, overcapacity still exists, although recently the situation has proved more promising.

Last year, polypropylene production in the U.S. totalled 25 million lb. and most of this was sold. Some 75% went to moulders and 25% to monofilament manufacturers with the balance going for other uses. Production by 1965 is now estimated at about 300 to 400 million lb.—a lower figure than was first suggested (up to a 1,000 million lb. by 1965). Of total polypropylene produced by 1965, 45 to 50% is expected to be used for film, 25% for fibres, and 25% for moulded products. Emphasis on its use for film, fibre and moulded products lies in the properties of this plastics material—i.e. transparency, toughness, tensile strength, light weight, ease of moulding and good rheological behaviour, but it could prove valuable for elastomers, adhesives, pipe and wire coating.

In the U.K. Imperial Chemical Industries and Shell have started construction of their L.P. polythene-polypropylene plants. Neither company has revealed how much of this new polyolefin capacity will be devoted to polypropylene and how much to L.P. polythene. Both plants were scheduled to be completed by 1961, although it is now announced that I.C.I.'s plant will be on stream this year. (CHEMICAL AGE, 23 January, p. 161). On the Continent, both Italy and Germany are producing polypropylene and expansion plans are already in being. Some polypropylene from these countries is being processed in the U.K. but how much is not known.

British producers are known to be considering their capacity position carefully, for the U.S. with the outlook of polypropylene overcapacity problems and an agressive export policy will prove formidable opponents.

BUSINESS FOR PLANT INDUSTRY

MAJOR construction projects so far announced this year should keep the U.K. chemical plant industry busy for some time. These new expansion plans follow a lean period so far as large-scale projects are involved, and while in some cases U.K. construction companies are concerned, they have not by any means secured the lion's share of the projects.

The latest projects announced by the Distillers Company (see p. 529) are not accompanied by the names of the main contractors, but at least one U.S. company is believed to be concerned. So far as the first two I.C.I. Severnside projects are concerned, that for ethylene oxide will be engineered by Scientific Design and that for ethylene glycol will be designed by I.C.I.'s own engineering staff.

The Petroleos Mexicanos large-scale refinery and petrochemical projects have so far brought contracting business to Simon-Carves, for the polythene plant, and a number of contracts to the joint U.K.-U.S company McKee Head Wrightson.

Project News

B.H.C. Build Butadiene Methanol, Ethylene Dichloride Plants

● MAJOR £5 million expansion programme for their Grangemouth petrochemical complex is announced by British Hydrocarbon Chemicals Ltd., who are owned jointly by British Petroleum and the Distillers Company Ltd. Three new plants are to be built, one of them to double existing capacity for butadiene, an important raw material for synthetic rubber production.

The other two plants are for the manufacture of methanol and ethylene dichloride. Methanol is used chiefly for the production of formaldehyde and ethylene dichloride is used in the making of p.v.c.

Capacity of the additions is not revealed. The new plants are designed to enable fuller use to be made of the third cracking unit which will have a capacity of 70,000 tons of ethylene a year when it comes into operation about the middle of this year. This unit, stated to be the largest of its kind outside the U.S., has a larger potential output than the first two cracking units combined, and although some of its production is intended to feed the extensions which have already been made to Grangemouth works, it would be inadequately employed without these new developments just announced. The new plants will create jobs for 100 persons.

B.H.C.'s production of butadiene, methanol and ethylene dichloride will be sold without further processing. Some of the output will be sold to companies in the Distillers group.

The major raw material used in the Grangemouth works is the petroleum distillate piped from the near-by B.P. refinery and then processed into ethylene and propylene. The chlorine necessary for the manufacture of ethylene dichloride will probably be bought from Murgatroyd's Salt and Chemical Co., jointly owned by D.C.L. and Fisons.

It is planned to commission each of the three new plants during 1961. The total investment is about £5 million.

Recently on stream at Grangemouth was the company's new cumene/phenol plant, using the D.C.L. phenol-acetone process and the Scientific Design process for cumene. Stone and Webster were the main contractors for this plant, first of its kind in the U.K.

● BAKER PERKINS, Peterborough, have secured a contract worth nearly £500,000 for pneumatic handling and mixing equipment for the new Carrington polyolefins plant of Shell Chemical Co. Ltd. Baker Perkins have for many years engineered complete pneumatic handling and mixing plants for the food industry; the most advanced installations have complete automatic control from a central control room.

Main contractor for the Shell polypropylene/polythene plant is Matthew Hall and Co.

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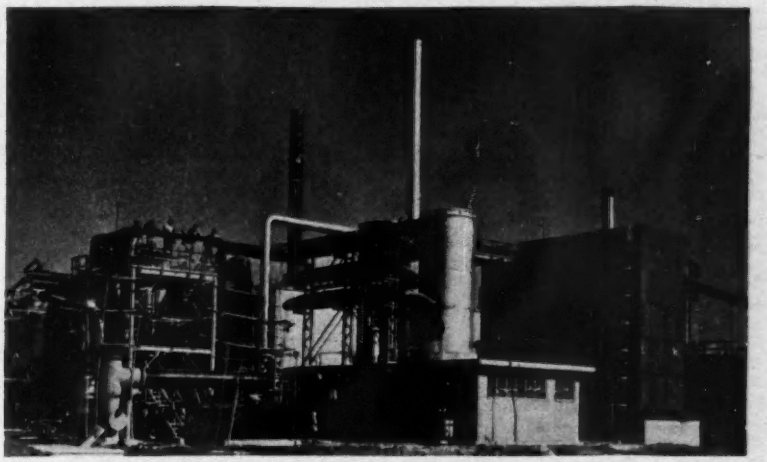


Sulphuric acid plant at Durgapur

Durgapur Acid Plant Achieves Rated Capacity in a Few Days

THE sulphuric acid plant capable of producing 60 tons a day, which forms part of the plant at Durgapur steel project, went into production recently and achieved its rated capacity a few days after commissioning.

Rock sulphur of high purity is used as the raw material for acid production, the process of manufacture involving burning of the sulphur to produce sulphur dioxide gas, which is then converted into sulphur trioxide in the presence of a catalyst. The trioxide is absorbed in sulphuric acid, which is then diluted with water to produce acid of 98½% strength.

In the process of production, surplus heat from the burning of sulphur and the catalytic conversion of sulphur dioxide to sulphur trioxide is utilised to produce approximately 5,000 lb. of steam an hour. Part of this steam is used in the plant for sulphur-melting and other purposes, the rest being passed into the steelworks steam mains. The sulphuric acid produced will be used primarily for the production of sulphate of ammonia.

The plant was designed, engineered and constructed by Simon-Carves Ltd. whose London office is at Simon House, 28/29 Dover Street, W.1, a member company of the I.S.C.O.N. consortium at Durgapur.

I.C.I. to Make Polythene in Denmark Under Joint Production Agreement

UNDER a new venture—the first in which I.C.I. undertake joint manufacture of polythene in Europe as opposed to licensing—a company is to be formed in Denmark for the manufacture of polyolefins. Initially, 15,000 tons a year of Alkathene, I.C.I.'s brand of polythene, will be made using their high-pressure process.

Partners in the new enterprise are Imperial Chemical Industries Ltd. and A/S Dampskibsselskabet Svendborg and Dampskibsselskabet of 1912 A/S, owners of the Maersk Refinery, Copenhagen. The polythene plant, to be built alongside the refinery, will be an important step in the development of plastics raw materials manufacture in the area.

I.C.I., who already produce about 100,000 tons a year of polythene in their own U.K. plant also produce through subsidiaries in Canada, India and Australia. A number of other manufacturers throughout the world are producing, or will produce, polythene under I.C.I. licence. World production in 1959 is estimated at 700,000 tons with 90% or some 600,000 tons made by the original I.C.I. high-pressure process.

The new company, to be known as Danbritkem A/S, Copenhagen, will have a capital of some D.Kr80 million (about £4 million) provided equally by the Danish and U.K. partners.

Obituary

Mr. E. J. Boake, son of the founder of A. Boake, Roberts and Co. Ltd., and a director of the company, died at Torquay on 17 March. He was 91 years of age.

Mr. George Wood, C.B.E., vice-president of Thos. W. Ward Ltd., Albion Works, Sheffield, died on 14 March after a long illness.

M. and B. Cut Working Hours

From Monday, 14 March, May and Baker Ltd., Dagenham, Essex, have reduced the standard working week for their factory staff from 44 hours to 42 hours.

★ NEWS of a new method for reducing the oil content of emulsified waste liquids to trace amounts, of the order of 1-5 mg. per litre reaches me from the British Coke Research Association, Chesterfield, who have developed the process. The method uses cheap, readily available materials such as fine coal or coke which do not need specialised treatment or preparation.

Wastes containing between 20 mg. and 2,000 mg. of oil per litre are treated in what is basically a two-stage process. Stage 1 is particularly effective with wastes containing more than 200 mg. of oil per litre and where oil is floating on the surface. Stage 2 is applicable where the initial oil content is 100 mg. per litre or less, such emulsions having been found to be the more difficult to treat. The oil referred to is non-volatile matter that is extractable by light petroleum.

This method of oil removal is of particular value to the coking industry and may well have useful applications in other industries with similar problems of oily effluents. It is stressed that any method of treatment, however good in itself, must be considered and possibly modified in relation to local conditions which may complicate what superficially appears to be a straightforward solution to the problem.

★ I UNDERSTAND that Baker and Perkins, Peterborough, who have already made over some U.S.$120,000 are reported to be about to pay a further $250,000 to the Israeli firm of Mahzavei Israel (Israel Mining Laboratories) in respect of a process developed by the firm in connection with the production of tetrabromethane.

The Israeli company plans to spend the $120,000—paid as licence fees—on erecting an experimental production unit at Sodom, while the $250,000 would cover furtner developments in Israel. The Mahzavei process could be very important in the processing of otherwise unusable mineral ores, it is stated.

A further process developed by the company, for the manufacture of phosphoric acid from a nitric acid base, is being shared on a licence basis with Toyo Soda Manufacturers Co., Tokyo, An experimental production plant is to be built in Israel, also at Sodom, and a similar unit in Japan.

★ WITH world polythene production now topping the 700,000 tons-a-year mark, there are no signs that market saturation is near. I.C.I. in co-operation with Danish partners now plan to produce their high-pressure polythene (production of which accounts for 90% of total world polythene capacity) in Denmark at a plant with a capacity for 15,000 tons a year (see p. 529).

This development is described as being for the "manufacture of polyolefins" and that polythene is the initial product. Although I am told there are no definite plans for other products, the wording of the announcement suggests that polypropylene is likely to be the next product at this Danish site.

This new venture makes history for I.C.I. because it is the first time that they have gone into joint production with European companies for polythene. Normally their policy is to licence the process to overseas companies. The development will certainly gladden the hearts of those at Imperial Chemical House who have felt it better business to link with foreign companies for the setting up of production facilities, rather than to licence a process. The chemical world will watch with interest to see if this venture heralds other similar arrangements, particularly in Common Market countries.

★ IT IS interesting to note that the Works Department of Edinburgh University have selected a laminated gaboon plywood in preference to teak for the recently installed new bench tops in the construction laboratory. This I am informed is bonded by a phenolic resin regarded as a closely guarded secret by the manufacturers, who have been employing the resin for some 10 years.

The high degree of stability claimed for the material is achieved by a combination of pre-drying and impregnation with a "synthetic resin which is cured under heat to form a protection for the individual layers of wood", a process said to result in "setting off one against the other" of stresses caused by atmospheric change.

Permaply benchtops, by Venesta Plywood Ltd., Vintry House, Queen Street Place, London E.C.4, have been installed in four departments of the University, the largest measuring 40 ft. long by 2 ft. 6 in. wide.

★ U.S. SECRETARY of Commerce, Frederick H. Mueller, considers that it would be harmful to U.S. security to permit unrestricted exports of strategic materials and data to the Sino-Soviet bloc, so he is asking for the Export Control Act of 1949 to be extended for two more years. Two firm policies have been revealed, however. The Commerce Department has refused to licence strategic commodities or technical data to European Soviet bloc countries: and has refused to licence any commodities to Communist China, North Korea and North Vietnam. Last year, however, controls over export to all destinations of technical data relating to petroleum and petrochemical plants and processes were tightened.

Reason for this attitude is that these plants and their products have strategic importance in U.S. eyes. As U.S. companies chiefly control the technology of these processes, the U.S. is in a good position to hold back expansion of the Sino-Soviet bloc petrochemical industry by controlling export of technology.

Classed as non-strategic data which can be exported to European Soviet bloc countries are production of plastics, pulp and paper, manufactured gas, reclaimed rubber, phosphoric acid and fertiliser.

Under a recently reached agreement understand that the B.A.S.F. high-pressure process for polythene, held by Scientific Design, has been licensed to a Swiss firm who have concluded an agreement for a plant to be built in Russia.

★ MUCH research has been carried out to improve the performance of the original pack since the Cubitainer was introduced in Britain a little over a year ago by Iridon Ltd., one of the Commercial Plastics Group, 75 Grosvenor Street, London W.1. The semi-rigid polythene inner, which has its own 'tailored' corrugated fibreboard outer, is made from low density resin with no plasticisers or additives.

Being non-returnable, cleaning and reclaiming plant is unnecessary. Filling is simple and existing equipment can readily be adapted. Heat sealing is the recommended method of closure. A simple tool, comprising a frame to hold the pack and a sealing iron, is available at between £7 and £8; a rate of three seals a minute can be achieved.

A special dispenser consists of a plastics probe attached to a novel clamp by a flexible tube. This is inserted through the outer and inner containers and allows a controlled flow. The Railway Clearing House has approved the pack and their approval is acceptable to British Road Services. For hazardous chemicals, the Ministry of Transport has to be approached by individual senders. Iridon tell me that they like their laboratories to test the suitability of chemicals for this type of packaging.

★ PROBLEMS associated with the surface finish of stainless steel vessels used for high-vacuum work have been to a large degree solved by an electropolishing process carried out by Electropol Processing Ltd., Trading Estate, Farnham, Surrey, the list of whose clients contains some very well-known names.

Shot blasting, buffing and chemical cleaning, although the latter is undoubtedly better than mechanical means, are liable in certain instances to leave residues which impede the achievement of high vacuua. Electropol Processing claim that their method is ideal, in that it creates the desired contamination-free stainless steel surfaces.

Alembic

NEW F.M.A. REPORT DISCUSSES TRENDS IN U.K. FERTILISER USAGE

INFORMATION on various aspects of the use of fertilisers in this country hitherto available only from separate sources or inaccessible to all except the specialists is now made available by the Fertiliser Manufacturers' Association Ltd., 44 Russell Square, London W.C.1, in a new publication, *Fertiliser Report and Statistics 1959*. Collated in the report is information published by the Ministry of Agriculture, the Board of Trade, Rothamsted Experimental Station and the Organisation for European Economic Co-operation (O.E.E.C.) with the associations own statistical records. The publication is freely illustrated with charts and tables in colour.

In the report changes in fertiliser concentration and demand for different nutrient ratios are detailed. Consumption of nitrogen is shown to have increased by 31.2% between 1952-55 and 1958-59. Phosphate use went up by 9.5% and the use of potash by 41.8% in the same period. The popularity of compounds is reflected by the increase in their use from 64.7% of total plant nutrients in 1952-55 to 72% in 1958-59. It is also noted that the $N:P_2O_5:K_2O$ ratio of the nutrients in compounds has changed appreciably from the 1:1.6:0.6 in 1945-46 to 1:1.3:1.6 in 1957-58, as consumption and concentration of nitrogen and potash have increased at faster rates than phosphate.

Switch to Compounds

The swing from straight fertilisers to compound forms is most clearly marked, the report indicates, in the case of water-soluble P_2O_5, 91% of which was applied in compound form in 1958-59 compared with 82% in 1952-55 and less than 33% in 1945-45. Basic slag consumption which is determined by availability of supply has been maintained over the period 1952-55 to 1957-58 at a seasonal average of around 100,000 tons of P_2O_5, but straight sales of ground rock phosphate have continued to decline. Between 1952-55 and 1957-58 the tonnage of nitrogen in compounds rose by 37.3% while the tonnage of straight nitrogen rose by 18.5%.

Acreage under root crops has decreased by over 200,000 acres since 1953 but temporary and permanent grass which traditionally receive less nutrient per acre overall than any other crop, now covers 63% of total agricultural land compared with 58% in 1933. Tonnage of all nutrients consumed has risen by 23% in the same period. F.M.A. states in the report that farmers appear to be: intensifying fertiliser practice on the declining tillage acreage—possibly recovering in yield what is lost in acreage; increasing application rates on grassland; and dressing grassland more extensively.

That section of the report which tabulates information derives from the Rothamsted surveys of fertiliser practice—data not previously published in detailed form—shows that compared with the Ministry of Agriculture Bulletin No. 36 *Manures and Fertilisers 1957* giving the recommended rates per acre for spring and winter cereal: N, 0.5 to 0.7 cwt.; total P_2O_5, 0.4 cwt.; K_2O, 0.4 cwt., the average actual rates for nitrogen are well below those recommended by the Ministry. This section of the report indicates the differences between arable and grassland areas.

Fertiliser use abroad is often higher than in the U.K. and the fourth section of the report shows, in detail, where these differences occur. The U.K. ranks eighth in potash and nitrogen consumption per acre and ninth, equal with France, in phosphate. With the exception of Norway and Iceland all countries consuming fertilisers at a higher rate than the U.K. have a smaller percentage of their total agricultural land under grass. In Belgium and Holland, rates per acre, particularly of nitrogen and potash, were higher on average than those in the U.K. not only on arable crops but on grassland also. In countries in which fertilisers are used intensively, there has been a rapid increase in consumption of nitrogen and potash with phosphate rising at a slower rate, a trend which may further change the ratio of the nutrients in favour of nitrogen and potash in the U.K. in future.

Estimates of fertiliser consumption in the fertiliser year 1958-59 compared with those in 1957-58 complete the body of the report. These show that 63% of total nitrogen was consumed in the form of compound fertilisers in 1958-59 compared with 59% in 1957-58. Sulphate of ammonia deliveries for mixing represented 159.9 thousand tons N or 49.8% of total nitrogen consumption compared with 146.4 thousand tons or 46.4% in 1957-58. A decline in consumption of single superphosphate was offset by an increase in demand for triple superphosphate and the tonnage of water-soluble P_2O_5 applied straight fell from 11% of the total in 1957-58 to 9% in 1958-59. A slight increase in straight sales of ground rock phosphate in 1958-59 is noted, although less was used for mixing than in 1957-58. This fertiliser accounted for only 16.2 thousand tons of water-insoluble P_2O_5. Deliveries of home-produced and imported basic slag fell from 765,000 tons (103,000 tons P_2O_5) to 730,000 tons (98,100 tons P_2O_5), thus largely explaining the fall in insoluble P_2O_5 consumption in 1958-59. Total potash consumption rose by 78% in 1958-59 and the greater part of this increase was in the form of compound fertilisers. Potash sales were maintained at approximately 15% of total K_2O consumption.

Attached to this report is a full appendix showing year-by-year changes in the consumption of each nutrient by province and country, and including a breakdown into the relative share of compounds and straight fertilisers.

I.C.I. Expanding Production of Phenol-Based Disinfectants and Preserving Agents

INCREASING production of phenol by I.C.I. has made possible a stepping up of Topane and Topane W.S. output, the company's brands of ortho-phenylphenol and sodium orthophenylphenate, which are potent disinfectants and preservative agents. The materials are known as excellent agents for prevention of mould and fungal attack in a broad range of materials, efficient at economically low concentrations and practically odourless.

Topane can be applied in a very practical manner by solution in organic solvents and in animal and vegetable oils, while Topane WS, the sodium salt, is complementary in that it is highly soluble in water. It is manufactured in technical and refined grades.

Typical applications for these versatile materials are rot prevention and sapstain in timber, 'red heat' in leather, fungal attack in fruit and vegetables, and of mould and rot in building products and textiles, including rope. It is also widely used in paint, paper, cosmetic, pharmaceutical, disinfectant and adhesive industries.

Many preservatives in use today, containing such compounds as cresols, chlorinated phenols and some of their salts, and some mercurials, although possessing good germicidal activities, have the disadvantage of being toxic to animals and humans. Further, some of these compounds have, of course, a reduced range of application due to their lack of solubility in water and restricted specific use either as bactericides or fungicides.

A considerable programme of experimental and applied work has been undertaken over the years by the I.C.I. Jealotts Hill Research Station on the application of materials for preservation of a great number of commodities, and the company believes that the Topane products go far towards meeting the ideal.

Pesticide Residues Symposium

A symposium will be held at Nottingham University on 14 and 15 July, at which a number of papers will be presented, including determination of pesticide residues, metals in soils and plants, consumer protection from residues and additives in feedstuffs. Further particulars may be obtained from Mr. C. A. Johnson, Standards Dept., Boots Pure Drug Co. Ltd., Station Street, Nottingham.

B.P.F. Sponsors Plastics-rubber Joint Research Association

PROGRESS in the British plastics industry, recorded in 1958, has not only continued but accelerated during 1959, said Mr. N. B. Punfield, retiring chairman of the British Plastics Federation, at the annual general meeting held in London on 16 March. "These figures must surely be very satisfactory to us all," he continued, "particularly as we remember that in 1938 our production of plastics materials was only 30,000 tons".

The Board of Trade figures for 1959 showed that net sales of plastics materials were 501,000 tons, which is 85,000 tons, or over 20%, higher than in 1958. This compared with a 16% increase in 1957 and a 6% increase in 1956. Exports rose sharply in 1959 by nearly 32,000 tons to a record level of 146,000 tons, almost 28% higher than the previous year.

With regard to reinforced plastics Mr. Redford prophesied that this side of the industry will continue to show a very rapid expansion. "Injection moulding, with a number of new materials becoming increasingly available, seems also certain to go ahead with ever increasing momentum, and the same applies, although to a slightly lesser degree to compression moulding, which also showed expansion in 1959."

On the subject of the Free Trade Area, Mr. Redford stated that "our federation's activities have naturally been dominated by detailed negotiations on behalf of the plastics industry with the Outer Seven countries. While the federation has supported the outlined proposals for a Free Trade Area of the Outer Seven, this is not so much for their intrinsic merits, but in the hope that the basic idea will offer a basis for subsequent arrangements with the Common Market to ensure free trade with the continent of Europe as a whole."

"We have also devoted much time to considering the necessary steps to obtain, for the first time in our history, the facilities and services of a research association. During the past year the federation has acted somewhat as a post office with regard to a scheme for the British plastics industry joining with the rubber industry to form a joint research association for plastics and rubber."

New British Geigy Plasticisers have Interesting Applications

TECHNICAL data on new plasticisers recently developed by the Geigy Co. Ltd., Rhodes, Middleton, Manchester, reveals that there is now available a low viscosity plasticiser of especial interest in p.v.c. paste formulations, Reomol RIG (formerly Reomol DV7), a high temperature cable plasticiser Reoplex 641 (formerly designated AD4/271) and a polyester plasticiser Reoplex 300.

Plasticiser for P.V.C. Paste. Reomol RIG combines low initial paste viscosity, good paste viscosity stability and a fairly rigid product after gelation. It is recommended in rigisol formulations for rotational casting, and in sprayable p.v.c. plastisols for metal coating. This latter development of solvent-free sprayable p.v.c. plastisols is still in its early stages of development.

Polyester Plasticiser. Designed for use in cellulose nitrate surface coatings is Reoplex 300, a polyester plasticiser. The principal formulations used contain 30 and 60 parts of plasticiser per 100 parts of dry polymer (23.1% and 37.5% on total solids). Reoplex 300 has been tested in a series of lacquers using the following formula: cellulose nitrate (½ sec.) 50 p.b.w.; butanol 22 p.b.w. butyl acetate 26.5 p.b.w.; ethyl acetate 36 p.b.w.; acetone 16 p.b.w.; and plasticiser 0-40. Varying amounts of thinner (toluene or benzene) were used.

High-Temperature Cable Plasticiser. From specifications regarding retention of elongation at break and tensile strength of specimens held at 113°C for 60 days, all the Reoplex plasticisers (Nos. 641, 100, 110 and 220) have proved to be suitable as high-temperature cable plasticisers. Reoplex 220 gave some indication of volatility in one test and of the three remaining Reoplexes, all are stated to be suitable.

Petroleum Equipment Mission to S. America

C.B.M.P.E. Petroleum Equipment mission to South America (see C.A., 19 March) will visit Chile as well as Argentina. Left to right are G. Goodrich, F. J. Erroll, L. S. Dawson and E. F. E. Howard

In Parliament

Trade with China

Quotas for imports of chemicals and pharmaceuticals from the U.K. to China for the period 1 January to 31 March 1960 were given as £350,000 by Mr. Erroll, Minister of State, Board of Trade, in response to a recent question on trade with China in the House of Commons. It was also stated that such trade was increasing, total value in 1959 being estimated at four times higher than in 1938.

Sulphate of Ammonia Restrictive Practices Court

The Registrar is not yet in a position to say when the sellers' agreement between the British Sulphate of Ammonia Federation Ltd. and its members is to be brought before the Restrictive Practices Court, it was stated by Mr. Rodgers, Parliamentary Secretary, Board of Trade, in the House recently in answer to a question.

Nerves Gas Tests

For a number of years the Chemical Defence Experimental Establishment at Porton has tested nerve gases, producing them in laboratory quantities for testing only, stated Mr. Soames, Secretary of State for War, in a written answer to a question in the House last week.

Arising out of further questions on the subject of nerve gases, the Secretary of State for War revealed that antidotes to the known nerve gases of other countries have been developed at the Chemical Defence Establishment, and that details have been published in scientific journals.

New Development Section for Gas Council

NEED for introduction of new sources of raw materials and new methods of processing coal have led the Gas Council to establish a development and planning section to be responsible for design and development to full scale size of new production processes including those discovered at the research stations of the Council.

The new section will also prepare plans on a national basis for an integrated supply system which is "the logical development of the policies of integration and concentration of production adopted by Area Gas Boards." The new proposal will also "ensure continuous contact between those responsible for research in the industry, and those responsible for commercial production." The Council will shortly be inviting applications for the appointment of a development engineer to take charge of the section.

Anti-Dumping Duty on Ethanediol

The Board of Trade are considering an application for the imposition of an anti-dumping duty on ethanediol (monoethylene glycol) imported from the U.S., under the usual conditions. Requests for details, should be addressed in writing not later than 8 April to the B.o.T. Tariff and Import Policy Division, Room 3136, Horse Guards Avenue, London S.W.1.

Details Released of Montecatini's New Range of Rubber-like Chemicals

SOME interesting statements concerning the activities of the Montecatini company in the Italian chemical industry were made by Mr. Piero Guistiniani, general director of the company, during a recent conference.

Montecatini technicians are attaching particular interest to crystalline polymers obtained generally from α-olefins. These consist of long linear macromolecules in which monomeric units alternate regularly with a configuration of atoms of tertiary carbon which Prof. Natta has described as isotactic structure.

Most important of isotactic polymers is polypropylene which is produced by Montecatini on an increasing scale, under the name of Moplen. An interesting application of isotactic polypropylene is the production of a special extruded film Moplefan. This film can be extruded in thicknesses not exceeding 20 micron, it is reported. If the film is flattened in one direction, this thickness can be reduced to 15 microns, while pressure in two directions leads to a record figure of 6 micron. The mechanical strength of Moplefan flattened in one direction is considerable, but if it is flattened in two directions, its strength exceeds that of other similar products.

While gases permeate the film considerable resistance to the passage of water vapour is presented and it is absolutely proof against oils or fats. Like Moplen, Moplefan resists temperatures exceeding 100°C and thus can be subjected to sterilisation. Its low specific weight and moderate cost are expected to ensure a notable commercial expansion for the film. A pound weight of Moplefan is said to be sufficient to cover an area of 99 square yards. A ton of one-yard wide strip of Moplefan laid along the ground would stretch for over 80 miles.

Another and even more important use of isotactic polypropylene is the production of textile fibres. Such fibres (obtained by means of melting spinning of the polymer) display features that promise a great future for them.

Fibre Strength

Average strength of the fibre is 6 gm. per "denaro" (24th of an Italian ounce) but it is possible to get 9 gm. or even more. Stretch properties are said to be higher than those of other synthetic fibres Its elasticity recovery is about double of that of polyamide 66, polyacrylates, or polyesters. Also it displays excellent resistance to chemicals and preserves its dimensional stability even at temperatures exceeding 100°C.

Societa' Polymer, of the Montecatini group, are now starting to produce this fibre, named Meraklon, at their plant at Terni. Initial output has been scheduled at 3,000 tons a year but early in 1961 it will be increased to 10,000 tons a year.

Processing Meraklon using various types of machines has indicated no drawbacks while its low thermic conductivity and reduced tendency to absorb moisture give it an advantage in comparison with wool. An important feature is the absence of pilling in articles made of Meraklon.

The study of isotactic polymers has gone, during the recent years, beyond polypropylene and Montecatini research work has involved both pilot and full-scale plants. Some polymers have shown a very high melting point. Such is the case of isotactic polystyrene (240°C), poly-3-methylbutene 1 (over 300°C) or poly-4-methylpentene 1 (240°C). Isotactic polybutene-1, however, has a rather low melting point (135°C), i.e. the same as the more linear polythenes, but it has other properties which permit its utilisation in sheet form. These sheets are very flexible even when fairly thick and stated to be remarkable for their tear strength. It can be used combined with films made of other plastics materials or metals.

Stereospecific Processes

The new stereospecific polymerisation processes have been applied also to diolefins. The studies carried out by Natta at the Polytechnicum in Milan and at Montecatini's research laboratories at Novara and Castellanza, have resulted in four pure stereoisomeric polymers of butadiene being obtained: syndiotactic polybutadiene with 1-2 chain; isotactic polybutadiene; polybutadiene with 1-4 *trans*-chain; 1-4 *cis*-polybutadiene. These four polymers have widely differing physical characteristics but it is sufficient to note, in this connection, that the melting point which is +1 in the case of unpressed pure polybutadiene with 1,4-*cis*-chain, becomes 148°C in the case of 1-4, *trans*, 125°C for *iso* 1-2 polybutadiene, and 155°C for syndiotactic 1-2 polybutadiene. The melting point of pure 1,4 *cis*-polybutadiene rises to nearly 100°C if the vulcanised product is subjected to pressure, in the same manner as occurs with natural rubber. In a similar manner, the modulus at 100% lengthening increases from 10 Kg. per sq. cm. for 1-4 *cis* (vulcanised) to 200 Kg./sq. cm. for 1-4 *trans* and 110 or 120 Kg./sq cm. both for isotactic and syndiotactic polybutadiene.

The last three stereoisomers are crystalline polymers which have a comparatively high melting temperature. At temperatures below the melting point, they behave like plastics materials and at higher temperatures, like elastomers; 1-4 *cis*-Polybutadiene, however, is an elastomer with excellent features. Vulcanised pure 1-4 *cis*-polybutadiene presents elasticity features similar to those of natural rubber and an extremely low fragility temperature. The most interesting feature of 1-4 *cis*-polybutadiene (of a purity exceeding 97%) is stated to be its high breaking point. Some experts assert that although 1-4 *cis*-polyisoprene is identical with natural rubber, pure 1-4 *cis*-polybutadiene is likely to have economic advantages in many practical applications.

The most surprising results, however, have been noted with copolymerisation of α-olefin and, with a diolefin. In fact, ethylene-propylene and ethylene-butylene copolymers are said to constitute an excellent new material from which to obtain rubber of superior quality. The problem is the creation of macromolecules that are linear, i.e. exempt from bulky lateral chains and exceptionally flexible. This is being achieved by replacing atoms of hydrogen in polythene by non-polar groups in order to destroy its crystallinity and to transform it into an elastomeric substance.

Elastomeric Properties

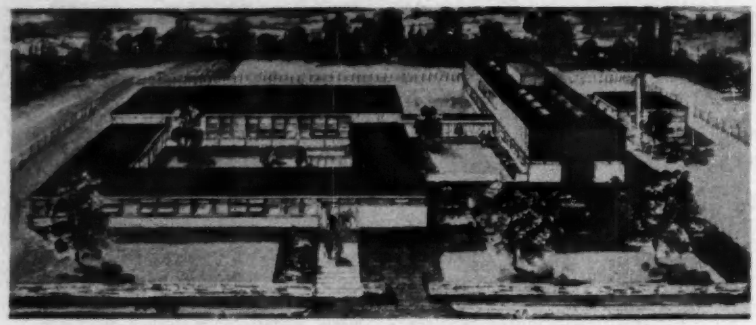
Ethylene-propylene and ethylene-butylene copolymers have elastomeric properties which Montecatini state are very close to those of natural rubber and superior to those of the common types of synthetic rubbers. Their "elasticity" is 75 or 80% at the temperature of 20° and decreases slowly with temperature until it reaches a minimum at the temperature of 35° or 40° below zero. They appear to be practically wholly devoid of cross-linking and thus have the composition and the properties of a saturated hydrocarbon. Therefore, special vulcanisation formulae (different from those of common non-saturated rubber) are necessary for them. Such new formulae have been worked out in such a manner as to permit the use of equipment and technology normally found in rubber industry.

These copolymers can be produced with any degree of viscosity required by the users, and thus no mastication technique is necessary during their processing in mixers.

Generally speaking, the mechanical features of vucanised products based on the above-mentioned polymers are reported to be superior to those of other synthetic rubbers. Vulcanised products fitted with reinforcements have been formed to display resistance to breaking up to 200 or 300 Kg. per square centimetre and they resist abrasion better than natural rubber. By virtue of their completely saturated structure, the copolymers in question show great resistance to heat, oxygen, ozone, and atmospheric elements. Their electrical properties are excellent, and thus their use appears to be particularly suitable in products which require first-rate insulating powers.

The processing cycle worked out by Montecatini on an industrial scale is stated by Mr. Giustiniani to allow ethylene-propylene and ethylene-butene copolymers to be obtained directly from mixtures of monomers and at a very low cost.

The first plant will operate at Brindisi where Montecatini are building a group of new plants. Initial output scheduled for the Brindisi works is 20,000 tons a year of ethylene-propylene and ethylene-butadiene and already an expansion programme envisages doubling of this output.



An impression of the new laboratories

Metal Containers Sign Know-how Agreement with U.S. Firm

CONSTRUCTION of a research laboratory at Passfield, Hants, has been started by Metal Containers Ltd., 17 Waterloo Place, London S.W.1, who with their U.K. associated companies are the largest manufacturers of steel containers in the U.K., operating six factories for the production of steel, fibre and plastics containers, as well as a closure plant. Internationally the company is part of the Van Leer Group, which originated in Holland and comprises 35 factories throughout Europe, Africa, Asia, and South America.

The decision to divorce research from the factory operations was taken some two years ago and implementation of this policy has been precipitated by a recent know-how exchange agreement between the Van Leer Group and the Inland Steel Container Co., the container division of the Inland Steel Co. of Chicago, one of the major U.S. container manufacturers, with plants in Chicago, Cleveland, Greenville, Ohio, Jersey City, and New Orleans.

The agreement provides for joint research and development and pooling of technical information on developments at the respective operations. The two companies now jointly own the Grotnes Machine Works, Chicago, previously a wholly-owned subsidiary of Van Leer, who manufacture container making machinery.

The Passfield laboratories are expected to be completed in September. The buildings have been designed for flexibility of extension.

New I.C.I. Process for Simultaneous Dyeing and Resin Finishing

RECENTLY introduced by I.C.I. Dyestuffs Division is the Procion-resin process, which makes possible the resin finishing of cloth at the same time as it is dyed. In the new process the Procion reactive dyes are applied in conjunction with commercially available resin precondensates to give dyeings that are "markedly superior in fixation and colour value to dyeings obtained by any established techniques." The dyed fabric at the same time is claimed to acquire all the benefits normally associated with a resin finish, especially improved crease recovery properties.

Economic benefits of this revolutionary two-in-one process are embodied in the elimination of separate dyeing operations, since the process follows the sequence of a normal resin finishing treatment; pad, dry, bake and wash off. The essential difference is in the addition to the pad liquor of the dissolved Procion dye and the special Procion-resin catalyst A. The processing technique is exactly the same as in conventional resin finishing, with the sole proviso that the treatment must be carried out carefully, with particular attention to proper maintenance of an adequate temperature at the baking stage. The final washing-off of unfixed dye is easier because of the greatly improved fixation, and the new process produces the required shades at a lower dyestuff cost.

The principle behind the process is based upon the dyes' reaction with cellulose under alkaline conditions—the principle of their application to cotton and viscose rayon. Under acid conditions they will react with polymers containing basic groups, and this forms the basis of their application to wool and nylon. They will also react under acid conditions with nitrogen resin precondensates, giving a stable chemical linkage. This feature, and the great similarity between Procion dyeing procedure and the sequence of operations followed in resin finishing, have together been exploited by the Division's technicians to devise the new process, which has been exhaustively tested in the laboratory and the results confirmed in large-scale trials.

The Procion dyes of the cold-dyeing type are, in general, those most suitable for application by the new process, although selected dyes from the less reactive Procion H class are also valuable.

Experimental Work on Cellulose Lacquers

Two methods involving a somewhat new development in the use of A-wax BASF for matting cellulose lacquers have been carried out experimentally by Bush Beach and Segner Bayley Ltd., Marlow House, Lloyd's Avenue, London E.C.3.

In the first the A-wax is dissolved in a small amount of hot hydrocarbon solvent such as toluene or xylene, and the balance of the hydrocarbon component is added to the solution cold under fast stirring. Alternatively the A-wax can be dissolved in the total bulk of hot hydrocarbon solvent and the solution cooled, again under continual stirring; this method giving a minimum and even-sized crystal.

It is stated that as the specific gravity of A-wax BASF is approximately 0.92, i.e., in the same range as the nitrocellulose lacquer, there is consequently little risk of flocculation or settling taking place.

The methods are set out in the company's wax technical service bulletin No. 65, which also includes details of Ceratrit waxes, designed to produce the extremely fine dispersions required for bright-drying wax emulsions and transparent dispersions.

Geigy's Multi-purpose Pigment Dispersions

NEWLY developed by the Geigy Co. Ltd., at Rhodes, Middleton, Manchester, are Irgalite MPS multi-purpose colours for decorative paints. They are dispersions of pigments with good light fastness and good resistance properties. The initial range of five is being extended; all colours can be intermixed and will provide a comprehensive range of decorative shades.

Irgalite MPS colours are said to give excellent results in most types of distempers, emulsion paints, flat oil paints, eggshell finishes and gloss paints. They are suitable for factory tinting or colouring systems.

The new Irgalite fast brilliant blue BNF is flocculation resistant phthalocyanine blue for decorative paints. Also new from Geigy is their plasticiser Reomol RIG, developed for paint formulations for p.v.c. plastisols which can be applied by spraying.

Letter to the Editor

'On Site' Preparation of Ferric Chloride

SIR,—I refer to your editorial in the 12 March issue (p. 444) headed 'Interest in Ferric Chloride'. My company, Huffer and Smith Ltd., regularly produces as a by-product of one of its processes an iron hydroxide precipitate which would lend itself to 'on site' preparation of a ferric chloride solution, should anyone be interested.

Yours, etc.,

Jason T. W. Mann.

Huffer and Smith Ltd.,
New Era Works,
Purley Way,
Croydon,

G.L.C. Automatic Analyser Developed for Wilton Works

By
J. Bartle, B.Sc.
I.C.I. (Heavy Organic Chemicals) Ltd.

In 1959, the Heavy Organic Chemicals Division of Imperial Chemical Industries Ltd. commissioned their third and largest olefin plant at Wilton. This was the first to have its full complement of automatic analysers built into it. It was also the first to be equipped from the outset with an automatic gas liquid chromatography analyser. It is significant that the plant was producing to specification 10 days after feedstock was first passed to it; the analysers certainly contributed to this achievement

IN I.C.I.'s Olefine Works at Wilton, there are some 34 major automatic analysers of various types, two of which are used as controllers. All these instruments are backed up with laboratory analyses based on principles as widely diverse as mass spectroscopy and the more familiar chemical methods.

Wide experience has been gained with automatic analysers on these petrochemical plants, which principally produce high-purity ethylene and propylene, butenes, butadiene, para-xylene and derivatives. In particular rapid progress has been made in developing the gas liquid chromatography (G.L.C.) method as an automatic analyser.

Techniques involving G.L.C. principles have for the past seven years been common aids as analytical tools when dealing with complex mixtures of hydrocarbons. For five years I.C.I. have used this method and applied it to automatic analysers. The adoption of the laboratory method has involved the design of automatic gas and liquid dispensers which will, according to a programme, inject into the chromatography column repeatable sample volumes of high accuracy. The G.L.C. method can yield with accuracy a wealth of information about quantities of constituents in complex mixtures, which previously may have required a number of analytical operations of different kinds to give an equivalent amount of information.

Limitations Overcome

Three years ago it was, in general, true to say that because of limitations in choice of detectors of great sensitivity and reliability, it was possible only to carry out reliable analyses for components which were present at a concentration of 1% or more in the mixture. However, in the past two years development of the radioactive isotope-excited ionisation gauges, along with gas-discharge tube detectors, have opened up the field for using G.L.C. as an analysis tool for components which are measured only in parts per million (p.p.m.) of the complex mixture. Because of their comparative insensitivities when using the older type detectors, such as the hot-wire katharometer or similar devices, the development of more efficient separation columns was not exploited to the full extent. As the more sensitive detectors have been developed, so has work been carried out to exploit these advantages by designing more efficient columns, which are by their nature capable of dealing only with small sample doses. It is worthwhile noting that sample sizes normally associated with G.L.C. units using katharometer-type detectors would overload the more sensitive detectors. Nevertheless, the net increase in sensitivity using reduced sample doses and highly sensitive detectors is sufficient to enable analysis to be carried out for components in the p.p.m. rather than the percentage range.

Automatically dispensing small sample doses in the range of fractions of millilitres of vapours and gases has presented great difficulties, but it is now true to say that this problem has largely been overcome; reliable analysers are working continuously and giving repeatable results.

The great majority of requests by plant operating management for automatic analyses are for information about trace components at various parts of the plant stream. The reason for this is that product purity is extremely important when plant products are destined for feed to polymerisation plants; also the greatest efficiency in operation of the plant is achieved only if there is total extraction of useful products.

It is an established fact that in well-organised plants, the major components of the stream can be inferred from operating temperatures and pressures. In many cases it may be convenient, although not essential to the process, to have continuous analyses such as are provided by on-stream analysers using non-dispersive infra-red techniques. Analyses which are carried out by this method must be carefully selected because in many cases hydrocarbon gases absorb strongly in the same infra-red band, leading to high cross sensitivities which will, if not taken care of, give rise to misleading analyses. The analyses provided by G.L.C. methods are, by the nature of the method, discontinuous and, if the information yielded is to be useful in automatic control applications, rapid successive analyses must be made. Such analyses of complex mixtures of hydrocarbons are now being realised by using more efficient columns, column switching techniques and flow acceleration during periods between peak emergence from the column.

It is important that results of analyses should be displayed, so that the process operator is presented only with the information he requires, but there should be no question of ambiguity or doubt about the value and identity of the particular measurements of interest. An instrument has been developed which, in conjunction with normal types of G.L.C. detectors, produces a record on a conventional multi-point potentiometric recorder, similar to the well-known multi-point temperature record. Additional facilities have been built into the instrument design, such that any, or all of the results presented on the recorder can be stored as a proportional pneumatic signal, which is changed only when new informa-

Fig. 1. Automatic gas liquid chromatograph process analyser

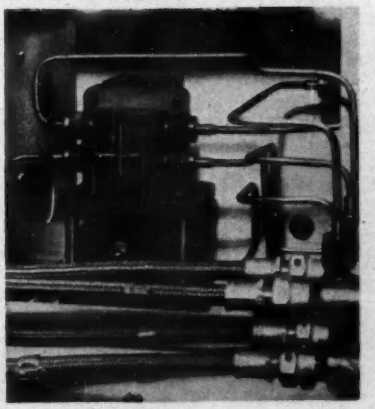
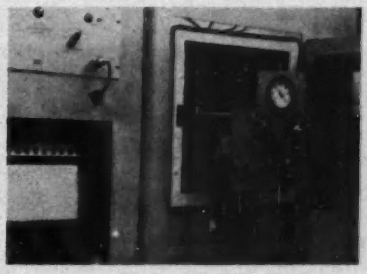


Fig. 2. Automatic value used for sample injection, left

Fig. 3. Below, analyser unit open (right-hand panel). The left-hand panel carries the Pye amplifier power unit as well as the recorder and control unit



tion is supplied by succeeding analyses. These pneumatic signals can conveniently be used in a cascade control system.

The G.L.C. analyser is already a formidable tool of proven reliability requiring much less maintenance than the familiar non-dispersive infra-red instruments and yielding more information, without ambiguity, than any other type of analyser of comparable simplicity.

I.C.I.'s Experience and Development Work on G.L.C. for Process Control

VIEWS and experience of Imperial Chemical Industries' Billingham Division engineering developments section on process control by gas chromatography, were outlined in a recent letter by the section's manager, J. Mawson, to the U.S. journal *Industrial and Engineering Chemistry* (1960, **52**, No. 2, 65A). He reports that the Billingham and Wilton plants now use a fairly large number of automatic plant stream analysers, mostly of their own design and construction based on several years of development work.

Mawson observes that in most cases the analysis time is sufficiently short when only a conventional single column is used. Where this system proved inadequate, the programmed carrier flow rate changes can often be used to reduce the analysis time, it is stated.

In developing columns of good long-term stability, most of the stationary phases in common laboratory usage have been satisfactory. In one instance, however, it proved to be necessary to pass the carrier gas through a bubbler containing the liquid phase (in this case dinonyl phthalate), before passing it into the column. By presaturating in this way, loss of liquid from the column was prevented and its useful life extended from a few hours to many months.

For automatic control, a peak selector and memory system has been developed which feeds a pneumatic signal to a conventional controller. This system works in conjunction with equipment which presents up to six peak heights on a multipoint recorder. For analysis of liquid streams, Billingham Division has designed sample valves for reproducible injection of liquid volumes of about 0.01 ml. For high-boiling materials, it has been found more satisfactory to use a liquid sampling valve followed by a flash heater.

Suitable for hydrocarbon determinations in the low parts per million region is the argon detector; acetylene in liquid oxygen is readily determined, according to Mawson, in the range of 0 to 5 p.p.m. I.C.I.'s investigations have shown that it is convenient to incorporate the Pye argon detector and associated electronics in their analysers. They have found this equipment so stable and reliable that they now prefer it to thermal conductivity devices even when its extreme sensitivity is not required.

A gas-discharge detector suitable for process use has been developed at Billingham for determination of the permanent gases in the low parts per million range. This detector can also be used at high sensitivity for hydrocarbon analyses, although the argon detector is the simpler device. Pending a convenient method for obtaining ultrapure helium for use in place of argon, I.C.I. have investigated and will publish shortly a method of sensitising the argon detector to permanent gases.

Glass 'Paper' Chromatography Used to Separate Sugars and Sapogenins

RECOMMENDED for the analysis of complex mixtures is glass paper chromatography. In biochemical research the technique has provided rapid qualitative and quantitative analysis, particularly with phospholipides, sugars, sapogenins, bile acids and glycerides.

For the 'paper' borosilicate glass fibres 0.5 to 0.75 micron in diameter are used. Spots that result are stated to be long and diffuse. For a better chromatogram the paper is treated with silicie acid or other compounds that interact with polar groups of the glass.

Advantages listed for glass paper chromatography are: use of corrosive spot test reagents; use of relatively high temperatures to develop spots; good separation with smaller samples than are possible with cellulose paper; and rapid separation for many materials, i.e. less than 20 minutes to apply sample and develop the chromatogram.

A quantitative procedure has recently been developed by Dr. James G. Hamilton, Tulane University School of Medicine. Sulphuric acid is used to char the spots and a densitometer measures the amount of char. As little as 0.25 microgramme of a compound can be determined quantitatively with accuracies within 5%, Dr. Hamilton claims.

Glass fibre paper was used in 1954 by Dr. Julius W. Diechert and Dr. Raymond Reiser to separate several lipids. Coated with silicic acid, the glass paper technique was used to separate lysolecithin, sphingomyelin, phosphatidylethanolamine, glycerides, and cholesterol esters. Solvents used were methanol-ether for phospholipids, and acetone-ether for neutral lipids. Now at the U.S. Department of Agriculture's Southern Utilization Research and Development Division, Dr. Dieckert *et al* have used the technique to separate sugars and saponins.

Diechert *et al* have shown that the bitter taste in peanut hearts is due to saponins, and they have separated four aglycones from these compounds and identified one as sapogenol β. *Cis-trans* isomers and epimers of steroids and bile acids have also been successfully separated. Hamilton and Dieckert have found that adsorption varies with the nature of the material with which the paper is impregnated. Alumina adsorbs them strongly, it is reported, followed by potassium silicate, monopotassium phosphate and silicic acid. Mobility is affected by solvent composition and faster travel is possible with solvent containing 95% or more benzene. The technique cannot be used for separation of fatty acids, however, unless they differ greatly in size and certain steroids and stereoisomers present problems, as yet unsolved.

S.A.C. Membership Reaches Record Level

A RECORD number of meetings, totalling 51 for all sections and groups, was reported by the Society for Analytical Chemistry on the occasion of its 86th annual general meeting, and the membership of 1,941 is also stated to be a record figure, with 24 new members.

The Society's current programme reflects its attempts to cover modern analytical methods and a wide variety of subjects, the report goes on. Much true analysis, particularly in the physical branches, is being performed by non-members, and thus the programmes are being designed to attract to the Society analysts with wide interests.

The Analytical Methods Committee has been extending its work and the reports on lonchocarpus, rauwolfia and capsaicin, jointly with the Chemical Society, formed the basis for a scientific meeting last November. A part-time publications secretary is now dealing with special publications outside the general scope of committee and panel reports.

The meeting was followed by the sixth Bernard Dyer Memorial lecture, given by Professor A. C. Frazer, professor of medical biochemistry and pharmacology, Birmingham University, with the title 'Chemical analysis and medical progress', during which the lecturer stated that more recruits were needed from both chemical and biological fields to make full use of developments in chemical analysis. Chemists, he said, must acquire understanding of the biological issues, and biologists (including doctors) must know enough chemistry, to work in close association.

Hycar Flexible Water Tanks

An order for two unusually large flexible tanks for storing drinking water under desert conditions has recently been completed by Fireproof Tanks Ltd., Airport, Portsmouth, using Hycar nitrile rubber. The tanks, ordered for Saudi Arabia, were required to hold 1,500 gall. each, to be collapsible and transportable. The outer cover of the tanks is of a Hycar/nylon laminate which combines high mechanical strength with abrasion resistance, while retaining its flexibility at extremes of temperature. An inner liner of specially compounded rubber ensures that the water remains fresh and palatable for a considerable period. Hycar is made by British Geon Ltd.

Overseas News

U.S. COMPANIES ANNOUNCE HIGHER PRICES FOR PHTHALIC ANHYDRIDE AND CHLORINE

AT the beginning of March, price rises for phthalic anhydride and liquid chlorine were announced by U.S. chemical companies. Following Reichhold's increase in phthalic anhydride price to 21 cents/lb. from 19 cents, Monsanto Chemical increased their price 2 cents to 19 cents/lb. Reason given by Monsanto for the increase was the restoration of profitability which was taken from phthalic anhydride some 12 months ago. Originators of the price increase in phthalic, Amoco say they have no intention of raising the price now. Nevertheless, some U.S. sources suggest that the current high price of naphthalene and relative shortage will force a general rise in the price of phthalic anhydride.

Liquid chlorine prices of two U.S. producers has risen. Pennsalt Chemical Corporation have increased their price for single-unit tank cars of liquid chlorine $4.00 a ton to $67. This 6.4% price increase is the first the company has made in bulk chlorine since 1956. Reason advanced by Pennsalt for the move are the mounting charges for labour, power, construction and tank car operation.

The other U.S. producers, Columbia-Southern Chemical, have raised their chlorine price, but only $2.00 a ton to $65. They have also increased their prices for soda ash and calcium chloride.

Other U.S. chlorine manufacturers, it is understood, are undecided as to whether they will follow suit and raise their prices.

Study of Spent Nuclear Materials Processing in U.S.

A U.S. group of five electric utilities and a chemical company, organised as Industrial Reprocessing Group, propose to undertake a study of the technical and economic feasibility of the design, construction and operation of a privately owned facility for the processing of spent nuclear fuels. Members of IRG are: Commonwealth Edison Co., Chicago; Consolidated Edison Co., New York; Detroit Edison Co., Detroit; Northern States Power Co., Minneapolis; Yankee Atomic Electric Co., Boston; W. R. Grace and Co.; Davison Chemical Division, Baltimore.

Roumania to build Indian Oil Plant

An oil refinery with an annual throughput of 750,000 tonnes, and a complementary by-products plant, are to be built in Assam for the State-owned Indian Refineries Ltd., using crude oil from the Nahorkatiya fields. Among the plants which will make up the refinery will be one for the ethylation of benzene, one for the plumbite treatment of benzene, and others for the sulphur dioxide treatment of crude oil, and production of petroleum coke.

New Carbonic Acid Unit at Leipzig Trade Fair

Displayed at the Spring Trade Fair which has just come to an end in the East German city of Leipzig was a newly developed unit for the extraction, purification and liquefying of zymotic carbonic acid. The unit, manufactured by the Wurzen, East Germany, firm of V.E.B. Maschinenfabrik und Eisengiesserei Wurzen, is aimed at permitting the use of waste carbonic acid produced in distilleries and breweries. Based on collection in a gasometer followed by passing through a three-stage compressor and liquefying in a counter-stream condenser, the process has an output of 100 kg. an hour.

New Synthetic Fibre Plant in Germany

The West German synthetic fibre manufacturer Vereinigte Glanzstoff-Fabriken A.G., of Wuppertal, a company associated with the British Courtaulds concern, are to expand production of their polyester fibre Diolen to satisfy growing demand. A new plant is to be built for the production of the fibre in Cassel, and the foundation stone to this will be laid in May.

U.S. Firm Plans Canadian Carbon Black Plant

Columbian Carbon Co., New York, will construct a plant for the manufacture of carbon black in the Toronto area of Canada. It is expected to begin operation in 1961 with an initial annual capacity of about 40 million lb. of oil furnace blacks.

Synthetic Fertiliser Venture in Malaya

Plant for the production of synthetic fertilisers is to be erected in Malaya by the Standard Vacuum oil concern, in co-operation with the Wah Chang Corporation of New York. The plant will adjoin an oil refinery to be built by the consortium. The British Shell company also have plans for the area, and want to build an oil refinery in Malaya for some $60 million and another refinery in the State of Singapore for some $40 million.

Chemical Production in Common Market

Figures have been issued in Brussels by the administration of the Common Market trade bloc showing the level of chemical production of the market's six member countries at the end of the third quarter of last year. With 1953 output levels indexed at 100, and the situation at the end of the third quarter of 1958 in brackets, production figures for the individual members were: West Germany, 191 (165); France, 212 (180); Italy, 204 (165); Holland, 140 (131); Belgium, 160 (133); and Luxembourg, 112 (127).

Nylon-66 Capacity Increase Planned by Chemstrand

Capacity for nylon-66 tyre, carpet and industrial yarns is to be increased by Chemstrand Corporation in the U.S. to over 188 million lb. a year of nylon filament yarns. Present annual capacity of Chemstrand's nylon filament yarn is 114 million lb.

At Greenwood, South Carolina, Chemstrand's plant now under construction will have an initial capacity of 10 million lb. Capacity will be increased also at both the Pensacola and Greenwood plants.

Synthetic Rubber Plant in Brazil

The Brazilian Government's programme to encourage domestic production of synthetic and natural rubber is expected to result in a decline in the proportion of imports to consumption. A large synthetic plant is to be built near the Duque de Caxias refinery, and another large plant projected for the State of Pernambuco. The former will produce between 30,000 and 40,000 tons a year. New natural rubber plantations are also being developed, but notwithstanding all developments, it is still estimated that by 1965 imports of such materials will amount to about half of the total consumed.

Canadian Chemical Co. to Produce Xanthates

Canadian Chemical Co. Ltd. will early in the third quarter of 1960 begin to produce xanthates, chemicals for ore flotation processes, at their Edmonton, Alberta, plant. This should reduce the Canadian mining industry's dependence on imported materials.

Dow Chemical to Increase Styrene Monomer Capacity

Dow Chemical will remain the main U.S. styrene monomer producer with their intended increase in capacity to 800 million lb. a year. Expansion will be evenly divided between the company's Texas division at Freeport and its Midland division at Midland, Michigan. Completion is scheduled for late this year or early next year.

Current styrene capacity ranges from 550 to 600 million lb. a year. The new expansion will allow Dow to retain their lead when Monsanto's 200 million lb. extension to their 360 million lb.-a-year plant comes into operation later this year.

Aluminium Vapour Compression Still for Desalting Sea Water

Under development by the U.S. Army Research and Development Laboratories, Fort Belvoir, Va., is a portable, all-aluminium vapour compression still for desalting sea water. Compared with

cupro-nickel equipment now in use, the aluminium unit will be lighter, have greater capacity and be economical on fuel. Early tests have revealed "very little corrosion".

For their finalised design the laboratories envisage a trailer-mounted 125 gall./hr. unit that could be delivered by helicopter.

Italy to Build Oil Refinery for Morocco

The Italian company Snam Progetti, a subsidiary of the State-owned E.N.I. oil concern, have received an order to build an oil refinery at Mohammedia, between the Moroccan towns of Casablanca and Rabat. The refinery, which will have a capacity of some 1,250,000 tonnes a year, is being built for the Italo-Moroccan concern Société Marocaine-Italienne de Rafinage, a company owned half by E.N.I. and half by the Moroccan State organisation Bureau d'Etudes et de Participation Industrielles. The project will cost between 7,000 million and 8,000 million Moroccan francs, or some £5 million to £5¾ million.

More Carbon Black Capacity for U.S. Continental Carbon

Now on stream at their Westlake, La, plant is Continental Carbon Inc.'s new carbon black unit. The company's Westlake capacity will be increased by 25 million lb. to 70 million lb. a year of furnace black.

Another Ethylene Plant for Phillips Chemical

Another ethylene plant is to be built by Phillips Chemical adjacent to their present ethylene plant at Sweeny, Texas. Construction bids are now being considered by the company for the new plant which is scheduled to be completed by the third quarter of 1961.

With their latest expansion which will be completed by April, Phillips' Sweeny plant will have a capacity of 290 million lb. a year of ethylene.

Europe's Biggest Gas-cracking Plant

The biggest gas separation plant in Europe, which will be able to crack natural gas to produce nearly 2 million cu. m. of domestic gas daily, is to be erected near Paris. The plant, which can be run on butane or benzene, is to be supplied by an Austrian concern which has just finished the construction of a similar plant in Vienna.

Lithium-butyl as Catalyst

Commercial quantities of lithium-butyl solution are being offered for use as a stereospecific polymerisation catalyst by the Foote Mineral Co., of Philadelphia, Pennsylvania.

Chemico Build Nitric Acid Plant in Record time

Only six months after the contract was awarded to them, Chemical Construction Corporation, New York, have brought on stream a $1.25 million nitric acid plant with a rated capacity of 120 tons a day for the Co-operative Farm Chemicals Association, Lawrence, Ka. Normally 10 to 12 months are needed to construct a plant of this type. The nitric acid will be used to make ammonium nitrate fertiliser. Chemico, who engineered and constructed the plant, have now handled 34 nitric acid plants.

Chemical-from-coal Plant for Limburg

The Flemish Trade Council of Belgium is considering the erection of a coal chemical combine in the Belgian province of Limburg. This would be one step in the campaign to aid the country's failing coal-mining industry, and is expected to meet with general approval.

New Toluene-Based Process for Dow Phenol Production

For their recently announced phenol unit at Kalama, Washington, Dow Chemical will use a new toluene-based process to make phenol. Some Dow patents are involved, also some licensed from California Research.

In the first stage of phenol production Dow will use their own process for oxidation of toluene to benzoic acid. The second stage which involves conversion of two moles of benzoic acid to one mole of phenol benzoate with a copper catalyst is covered by California Research patents. Phenol benzoate is then hydrolysed to give one mole of phenol and one of benzoic acid.

Advantages of the process are stated to be: no by-products, production economies, less process waste and easier treatment of that waste.

I.C.I. Subsidiary to Make Rubber Auxiliaries in India

Construction is to be started soon on a plant to produce various chemicals for the rubber industry by Alkali and Chemical Corporation of India Ltd., an I.C.I. subsidiary. The unit will be located near Calcutta and I.C.I. will provide the know-how and finance to cover the cost of equipment, which must be imported.

Other plans are in the design stage and will be announced later this year

New Plants for Dow of Canada

Work will commence this spring on construction of the Dow Chemical of Canada Ltd. plant at Fort Saskatchewan, near Edmonton, and the first facilities will provide production for ethanolamines, glycols and pentachlorophenol. The latter plant is scheduled to go into production late this year or early next year, and the other facilities in the late summer of 1961.

Latest Newcomer to U.S. Polypropylene Field Plan 100 Million-lb-a-year-plant

LATEST U.S. company entering the polypropylene field is Avisun, the joint company formed by American Viscose and Sun Oil. They plan initially a 100 million lb.-per-year plant to make polypropylene, most probably at New Castle, Delaware, where Avisun has polypropylene film and fibre facilities. Estimated date of start-up is mid-1961.

At present Avisun have 20 million lb. capacity at Port Reading, N.J., in facilities leased from Koppers. The company plans to have a capacity of 150 million lb. a year of polypropylene eventually.

Present U.S. companies in the polypropylene field are: Hercules, with a 20 million lb. production of polypropylene and who intend to build a 100 million lb. plant in several stages at Lake Charles, La.; Humble, now starting up their 40 million lb.-per-year plant at Baytown, Texas, and which can, Esso state, be increased to 100 million lb.; Dow Chemical will shortly have a 10 million lb. plant at Bay City, Michigan, in operation and are to build a 30 million lb. plant at Torrance, California; Firestone Tire and Rubber will have a 5 million lb. plant on stream in 1961 at Hopewell, Virginia; Texas Eastman's 20 million lb. plant is due to start up later this year; and Montecatini subsidiary, Novamont, will have a 25 million lb. plant on stream in 1961.

There are other U.S. companies interested in polypropylene, however (*Chem. and Engng. News*, 1959, **38**, No. 10, 32). An announcement regarding a dual-purpose polythene/polypropylene plant of about 50 million lb.-a-year capacity is expected from National Distillers. Monsanto Chemical admit to carrying out pilot plant trials with polypropylene, but have not revealed commercial plans. U.S. sources have suggested that E.I. du Pont de Nemours will use half the output of their 60 million lb.-a-year polyolefin plant at Orange, Texas, due to be completed shortly, for polypropylene. This is denied by Du Pont. Similarly, it is suggested that Union Carbide Plastics' 30 million lb. Ziegler plant at Institute, West Virginia, may be used for polypropylene production.

Still other companies considered to be likely polypropylene producers are Allied Chemical, Shell Chemical, Spencer Chemical, Goodrich-Gulf, Phillips Chemical Continental Oil, Amoco, Koppers, W. R. Grace and Foster Grant. Allied Chemical, for instance, are putting up an estimated 50 to 62 million lb. polyolefins plant at Orange, Texas, of which 20 to 25 million lb. is suggested as likely to be for polypropylene. Spencer Chemical have said they may build a polypropylene plant depending on the development of the market. At present it markets this plastics material from Humble and Enjay, *Chem. and Engng. News* notes. Shell and Goodrich-Gulf have not said anything about commercial plans for polypropylene although Goodrich-Gulf have a 13 million lb.-a-year polyolefins plant at Port Neches, Texas, due to be completed by the end of this year.

PEOPLE in the news

● **Sir Eric Rideal, Ph.D., D.Sc., F.R.S.,** lately director of Monsanto Chemicals Ltd., has been appointed chairman of the Surface Activity Group, the Society of Chemical Industry, for the 1960-61 session. Hon. treasurer (re-appointed) for the new session is Mr. R. C. Tarring, B.Sc., A.R.C.S., manager of the Detergents Dept., the Shell Chemical Co. Ltd. Hon. recorder and hon. secretary (re-appointed) are Mr. F. Riley, London area manager, Marchon Products Ltd., and Mr. M. K. Schwitzer, M.I.Chem.E., director of Armour Hess Chemicals Ltd., 4 Chiswell Street, London E.C.1.

● **Mr. C. E. Wrangham** has succeeded **Major W. R. Brown** as chairman of the Power-Gas Corporation. He joined the board in 1952, and subsequently became vice-chairman and managing director. He is also a director of Ashmore Benson Pease and Co. Ltd., P.G. Engineering, and other companies.

Major Brown, who joined Power-Gas in 1928, remains on the board of Ashmore Benson Pease and Co.

● **Mr. M. Soffa,** director and general manager of Jeltek Ltd., Green Lane, Hounslow, Middlesex, is visiting Canada and the U.S. at the end of March to attend the Toronto Safety Congress, at which his company are exhibiting.

● **Dr. M. E. Haine, D.Sc., M.I.E.E., F.Inst.P.,** has been appointed director of A.E.I. Harlow Research Laboratory. He succeeds **Dr. G. W. Sutton, B.Sc., Ph.D. (Eng.), M.I.E.E.,** who has retired, but who is continuing in a consultative capacity until May.

● **Mr. C. D. W. Stafford,** managing director of Beecham Research Laboratories Ltd., has been elected chairman of that subsidiary, remaining also managing director. In addition, he has been elected to the board of the Beecham Group. Mr. Stafford has been with the Research Laboratories since their foundation in 1945.

C. D. W. Stafford

● **Mr. S. Howard** has been appointed chairman of I.C.I. Pharmaceuticals Division in succession to **Mr. P. A. Smith,** who retires on 31 March. **Mr. G. W. Innes,** who has been manager of northern regional sales area since 1957, succeeds Mr. Howard as joint managing director of Dyestuffs Division. **Mr. E. D. Carey,** who has been managing director of Pharmaceuticals Division since 1956, succeeds Mr. Innes.

Mr. Howard, who joined the British Dyestuffs Corporation at Hexagon House, now the headquarters of I.C.I. Dyestuffs Division, in 1922, has spent much of his career in the sales organisation, and was appointed successively Division home sales manager and director in charge of home sales. In 1956 he became joint managing director of the Dyestuffs Division. Mr. Innes, a graduate of Oxford University, joined I.C.I. in 1946 and in 1948 became secretary of Alkali Division. After a number of appointments he became northern regional manager in 1957.

Mr. Carey joined United Alkali Co. Ltd., one of the four companies which merged to form I.C.I., in 1924. He later became deputy regional manager of the northern region, and was then appointed commercial director of Imperial Chemical (Pharmaceuticals) Ltd.

E. D. Carey

S. Howard

● **Professor D. H. Hey, F.R.S.,** Daniell Professor of Chemistry at King's College, London University, has returned from the U.S.S.R., where he lectured on organic chemistry. The visit was part of an exchange agreement organised by the British Council, in which 12 British university professors participated.

● **Mr. G. E. E. Linken, F.C.A.,** secretary to Williams (Hounslow) Ltd., dyestuffs manufacturers, Hounslow, Middlesex, has retired. He is succeeded by **Mr. L. C. Parsons, A.C.A., F.C.I.S.**

● **Mr. F. Holmes, B.Sc., A.R.I.C.,** lecturer at the Chemical Department, Bangor University, has been re-elected chairman of the Society for Analytical Chemistry, Microchemistry Group, for the forthcoming year. Re-elected vice-chairman is **Mr. C. Whalley, B.Sc., F.R.I.C.,** who is chief analyst of Laporte Chemicals Ltd., Luton. Hon. secretary, also re-elected, is **Mr. D. W. Wilson, M.Sc., F.R.I.C.,** senior lecturer in chemistry, Sir John Cass College, London. Hon. treasurer is **Mr. G. Ingram, A.R.I.C.,** chief microanalyst of Courtaulds Ltd., Maidenhead research laboratory.

● **Mr. F. W. Catley** has been appointed assistant sales manager of Bayer Products Ltd., Kingston-upon-Thames, Surrey. **Mr. J. A. Green** has taken over from Mr. Catley as regional sales manager in South East England, and **Mr. H. R. Martin** has become field training officer.

● **Mr. C. H. Glassey,** chairman of British Industrial Plastics Ltd., and of B.I.P. Chemicals Ltd., has been elected president of the British Plastics Federation for the current year. **Mr. D. Radford,** director and general manager of Ekco Plastics Ltd., becomes chairman in succession to Mr. N. B. Punfield. Vice-chairman is **Mr. F. Walls,** I.C.I., and hon. treasurer **Mr. R. P. Anderson.**

● **Mr. R. N. Wheeler** has been appointed to the staff of Egham Technical Services Laboratories of the Shell Chemical Co. Ltd. Among his duties he will be particularly responsible for technical liaison with Government departments and official bodies regarding products handled by the company's Industrial Chemicals Division.

● **Major General G. E. Wildman-Lushington,** chairman, and **Mr. John M. Lancaster,** managing director, British Sulphur Corporation, left England on Wednesday to visit the U.S. and Mexico. They will be meeting sulphur producers and consultants in the U.S. and will visit Mexican sulphur deposits.

Dr. J. G. M. Bremner the new research director of Scottish Agricultural Industries Ltd.

● The Minister of Power has appointed **Mr. W. K. Hutchison,** deputy chairman of the Gas Council and president of the Institution of Chemical Engineers, a member of the Scientific Advisory Council in succession to **Sir Henry Jones.**

● The Council of Scientific and Industrial Research has appointed **Mr. R. M. Wynne-Edwards,** managing director, Constructors John Brown Ltd., chairman of the Building Research and Road Research Boards for the period 1 April 1960 to 31 March 1965. He succeeds **Sir Herbert Manzoni,** chairman, Building Research Board, and **Mr. E. John Powell,** chairman, Road Research Board, who complete their terms of office at the end of this month. This is the first time the same person has held the chairmanship of the two Boards simultaneously.

Commercial News

- **Laporte to Raise Capital with Scrip Issue**
- **Monsanto Turnover Tops Record by £2.7 m.**
- **Olin Mathieson to Enter Petrochemicals**
- **Shawinigan Receive First Hedon Dividend**

Laporte Industries

For the year to 31 March 1960, the Laporte Industries Group has been reaping the benefit of certain long term developments and from capital invested in recent years. These factors, coupled with improved trading conditions, will, it is stated, result in a successful year's operation. Some of the reserves are to be capitalised and an issue made to Ordinary shareholders on the basis of one for five. The new shares will rank for final dividend payable in July.

The directors intend recommending a final dividend on increased capital of 7½% which, with the 3% interim already paid, is equivalent to a total dividend of 12% on existing capital. It is expected that earnings cover for the increased distribution will remain about the same as in recent years.

During the past year, employees have had their working hours cut to 42 hours a week and staff members have received general salary increases. The company is taking active steps to raise pension fund benefits for all group employees, additional to the benefits of the Government scheme for graduated pensions which comes into force next year.

So far as the consumers are concerned, the company will continue its policy of reducing prices as conditions are appropriate.

Monsanto Chemicals

Export business "contributed notably" to the record turnover of £18.4 million of Monsanto Chemicals Ltd., 10-18 Victoria Street, London S.W.1, a figure which beats the previous record year of 1957 by £2.7 million.

During the year expenditure on capital projects totalled £1,964,273 (£3,461,106), a reduction reported as a measure of progress made in completion of the major construction programme at Fawley. Plastics showed a "remarkable growth" during 1959, polythene from Fawley being added to polystyrene from Newport. Group net profits were £1,693,266 (£1,016,274) and the final dividend is raised by 1½% to 15%.

Hilger and Watts

Scientific instrument makers, Hilger and Watts had a group net profit for the year ending 30 September 1959 of £126,575 (£112,754). Effective dividend totals 15% (same), and a one-for-five scrip issue and one-for-four rights issue as 21s per 5s share is announced.

Olin Mathieson

Chemicals accounted for 31.1%, worth $218.1 million, of the sales of the Olin Mathieson Corporation for the year 1959. Consolidated net sales of the Corporation totalled $702,023,000 for that year, an increase of 17% over 1958.

The financial position continued to improve in 1959, and major expansion of the organic chemicals facilities and diversifications into new product areas based on ethylene and propylene are already under way. Other projects in hand include additional chlor-alkali capacity and modernisation of existing facilities; and expansion of pharmaceutical research and production.

Canadian Chemical Co.

Net sales of Canadian Chemical Co. Ltd. and subsidiaries for the year ended December 1959, totalled $26,272,766, an increase of 20% over the previous year.

Net income for the year amounted to $3,319,005 or 66 cents per share ($770,730, 15 cents).

Dow Chemical Co.

Dow Chemical Co. of Midland, Michigan, calculates a turnover of some $800 million for the financial year to end on 31 May next ($705 million). Net profit per share is expected to rise from $2.39 in the past financial year to $3.25 for the current period. For financial year to begin on 1 June 1960, it is estimated that within three months the turnover rate will be up to an annual equivalent of $1,000 million. The company, whose present output is split into 50% chemical production, 35% plastics and the rest metallurgical production (particularly magnesium), plans to have invested $75 million in the current financial year and to invest between $100 million and $125 million in the coming financial year, these investments including the building of a large plant in the Pacific north-west area and the expansion of its Canadian subsidiary. Dow prices have fallen 2% since last year and by 6% since 1952, and further price reductions are stated to be likely.

B. F. Goodrich

Capital expenditure for new and improved equipment by the B. F. Goodrich Co. in 1960 will be approximately $50 million, it is reported. This will be the largest outlay in the company's history.

International Nickel

Group net earnings of International Nickel Co. of Canada for 1959 were U.S.$85,157,000 ($39,665,000). The 1959 earnings reflected "one of the sharpest and swiftest recoveries in demand for nickel in the history of the industry". Deliveries of platinum metals were the second largest for any year.

The company in 1959 delivered a record 317,040,000 lb. of nickel (205,800,000 lb.). The 1959 recovery in nickel demand reflected industry's renewed confidence in a plentiful nickel supply, the market development efforts of the company, and a world-wide rise in business activity. Capital expenditures in 1959 totalled $66,902,000, more than two-thirds of which went on the development of the new nickel project at Thompson.

Free-world nickel deliveries reached an estimated record 515 million lb. in 1959. Free-world consumption was at a record of about 420 million lb. Deliveries of platinum metals—platinum, palladium, rhodium, ruthenium, and iridium—were 384,600 oz. in 1959 (145,400 oz.) The average published price of platinum in the U.S.—$52 per troy oz. at the beginning of 1959—recovered to $77, while that of palladium rose from $16 to $23 per troy oz. By 19 February 1960, the average price of platinum had risen to $82, and of palladium to $25.

J. R. Geigy A. G.

Net profit of J. R. Geigy A.G. for the year ended December 1959 was 10,488,604 Swiss francs, or £874,500 (£791,380). A dividend of 120 francs a share (£10) was suggested for the shareholders' meeting held this month. Dividend for 1958 was equivalent to £8 15s.

E.N.I. Group

All the capital of the Societe Raffineries du Rhone is now held by the Swiss company Societe Financiere Italo-Suisse, according to an announcement from the E.N.I. state group. E.N.I. now holds all the capital of Societa Oleodotti Internazionali. Formerly E.N.I. held two-thirds of the capital and Swiss interests the remainder.

Shawinigan Chemicals

A "very considerable improvement" in the business and earnings of Shawinigan Chemicals Ltd., wholly owned subsidiary of the Shawinigan Water and Power Co., Montreal, Canada, is described in the group's 62nd annual report. Dividends from the chemicals company totalled $1,938,122 for 1959, compared with $865,205 for 1958.

With issue of 118,909 common shares in February to Union Carbide Canada Ltd. for purchase of its 51% interest in Canadian Resins and Chemicals Ltd., which was sold in turn to Shawinigan Chemicals for 145,069 shares of their common stock, the company's investment in Shawinigan Chemicals was increased by $3,626,725.

Shawinigan Engineering commenced construction of a new sodium cyanide plant at Shawinigan East for the chemicals company, due for completion this year.

Dividends received from Shawinigan Ltd., London, were $59,993 ($60,954). This company acts as sole agent in the U.K. and European markets for the chemicals company and their associates. Hedon Chemicals Ltd., Hull, England, jointly owned with the Distillers Co. Ltd., manufacture vinyl acetate, and completed the fiscal year "with a modest profit and an initial dividend of $16,315".

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. D/d in ret. barrels (tech. acid barrels free); in glass carboys, £8; demijohns, £12 extra. 80% tech., 10 tons, £97; 80% pure, 10 tons, £103; commercial glacial, 10 tons, £106.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £37 10s.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. Mono-and di-, ton lots, d/d, £106 and £97 10s.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots; crimson, 5s d/d to 5s 5½d; golden, 3s 3½d d/d per lb. to 4s 8½d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 5-ton lots or more, bag packing, £41 per ton.

Barium Chloride. 2-ton lots, £45.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £39.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian sacks, c.p. Tech. anhydrous, £70; gran., £47; crystal, £50 10s; powder, £51 10s; extra fine powder, £52 10s; BP, gran., £56; crystal, £59 10s; powder, £60 10s; extra fine powder, £61 10s. Most grades in 6-ply paper bags, £1 less.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78; crystal, £87; powder, £84 10s; extra fine powder, £86 10s; BP gran., £91; crystal, £99; powder, £96 10s; extra fine powder, £98 10s. Most grades in 6-ply paper bags, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2¾d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid. In kegs, 1-4 cwt. lots, per cwt., £9 18s 6d; 5 cwt. lots, up per cwt., £9 15s; packed in paper bags, 5 cwt. lots, up, per cwt., £9 8s 6d.; 1-4 cwt. lots, per cwt., £9 13s 6d.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 2s 1d.

Copper Sulphate. £80 per ton less 2% f.o.b. Liverpool.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £40.

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £12 1s 6d. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £119 0s 0d; 35% wt., d/d, £143.

Iodine. Resublimed BP, under 1 cwt., per lb., 11s; for 1-cwt. lots, per lb., 10s 6d.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc. Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodoform. Under 1 cwt., per lb., £1 2s 4d for 1-cwt. lots, per lb., £1 1s 8d, 5 cwt., per lb., 21s 1d, crystals, 3s more.

Lactic Acid. Pale tech., 44% by wt., per lb., 14d; dark tech., 44% by wt., per lb., 9d; chem. quality, 44% by wt., per lb., 12½d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basic prices: 15-cwt. drum lots, Genuine dry red, £108 10s per ton; orange lead, £120 10s per ton; Ground in oil: red, £128 15s, orange, £140 15s.

Lead, White. Basic prices: in 5-cwt. drums, per ton for 2 ton lots, Dry English £120; Ground in oil, £139.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-cwt. drum lots, £110 10s per ton.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £16.

Mercuric Chloride. Tech. powder, per lb., for 1-ton lots, £1 1s; 5-cwt. lots, in 28-lb. parcels, £1 1s 3d; 1-cwt. lots, £1 1s 6d.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s 6d; 1-cwt. lots, £1 11s.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 56 lb. paper bags, c.p., about £130.

Phosphoric Acid. Tech. (s.g. 1.700) ton lots, c.p., £100; BP (s.g. 1.750), ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £76.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2¼d.

Potassium Iodide. BP, under 1-cwt., per lb., 7s 2d; per lb. for 1-cwt. lots, 6s 11d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11¾d; 3-cwt. lots, per lb., 1s 11¼d; 5-cwt. lots, per lb., 1s 10¾d; 1-ton lots, per lb., 1s 10½d; 5-ton lots, per lb., 1s 10d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £9 18s; 5-cwt. in 1-cwt. drums, per cwt., £10; 1-cwt. lots, £10 9s.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6d, cwt. lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £16 11s 6d.

Sodium Acetate. Comm. crystals, d/d, £75 8s.

Soda, Caustic. Solid 76/77%; spot, d/d 1-ton lots, £33 16s 6d.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £12 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots, about £75 per ton.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Gran. Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¾d. Net del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 56 lb. per lb., 10s; 56 lb. and over, 9s 9d.

Sodium Metaphosphate [Calgon]. Flaked, paper sacks, £133.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton, £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10% available oxygen) in 1-cwt. free kegs, 1-ton lots, £129 10s; in 1-cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £88; tri-sodium, crystalline, £39 10s, anhydrous, £86.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches., 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra, £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £19.

Sodium Sulphate [Glauber's Salt]. D/d, up to £14.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £36 2s 6d; broken, d/d, in drums in 1-ton lots, £37 2s 6d.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £9 15s. per ton. £11 7s 6d; 140° Tw., arsenic free, £8 2s 6d; 140° Tw., arsenious, £7 17s 6d.

Tartaric Acid. Per cwt.: 10 cwt. or more, in kegs, 300s; in bags, 292s per cwt.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Per ton: white seal, £107 10s, green seal, £105 10s; red seal, £102 10s.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £128; in 10-gal. drums, £118; in 40-45 gal. drums, under 1 ton, £93; 1-5 tons, £90; 5-10 tons, £89; 10 tons and up, £88; in 400-gal. tank wagons, £85.

Butyl Acetate BSS. 10-ton lots, £165.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £137 10s.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45 gal. drums, under 1 ton, £133; 1-5 tons,

£130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

tert-**Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400-gal. tank wagons, £142.

Dibutyl Phthalate. In drums, 10 tons, d/d per ton, £203; 45-gal. 1-4 drums, £209.

Diethyl Phthalate. In drums, 10 tons, per ton, £187 10s; 45-gal. 1-4 drums, £193 10s.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £179; 45-gal. 1-4 drums, £185.

Dioctyl Phthalate. In drums, 10 tons, d/d, per ton, £276; 45-gal. 1-4 drums, £282.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.

Ethyl Acetate. 10-ton lots, d/d, £137.

Ethyl Alcohol Fermentation grade (PBF 66 o.p.). Over 300,000 p. gal., 3s 10½d; d/d in tankers, 2,500- 10,000 p. gal. per p. gal., 4s 0½d. D/d in 40/45-gal. drums, p.p.g. extra, 2d.

Absolute alcohol (74.5 o.p.), p.p.g. extra, 2d.

Methanol. Pure synthetic, d/d, £40.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 7½d; 100-499 gal. in drums, d/d per gal., 6s 0½d-6s 2½d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 5s 11d; 100-499 gal. in drums, d/d, per gal., 6s 4d-6s 6d.

Methyl Ethyl Ketone. All d/d. in 40/45-gal. drums, under 1 ton, £143 10s; 1-5 tons, £138 10s; 5-10 tons, £136 10s; 10 tons and up, £143; in 400-gal. tank wagons, £134 10s.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***iso*Propyl Acetate.** 10 tons, d/d, 45-gal. drums £132.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. GPF: Ex-store, Swansea. Min. 3-ton lots, one delivery, 7½d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 7¾d per lb.; ex-store, Manchester, London and Glasgow, 8¼d per lb. HAF: ex-store, Swansea; Min. 3-ton lots, one delivery, 8d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 8¼d per lb. Ex-store Manchester, London and Glasgow, 9d per lb.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb., 1s 4½d to 1s 7d; dark, d/d, per lb., 1s 0½d to 1s 4d.

Lithopone. 30%, about £57 10s for 5-ton lots.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £50.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s 3d; pure, 5s 7d.

Carbolic Acid. Crystals, min. price, d/d bulk, per lb., 1s 4¾d; 40/50-gal. ret. drums extra, per lb., ½d. Crude, 60's, per gal., 8s 4d.

MANCHESTER: Crystals, d/d, per lb., 1s 4d-1s 7d; crude, naked, at works, 8s 5d.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.

MANCHESTER: Per gal., 1s 2d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 7s 4d. D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, 8s; per US gallon, c.i.f. NY, 103.50 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s 3d. heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 3s 11d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £22-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£68.

Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 16s 6d about.

Toluol. Pure, per gal., 5s 9d; 90's, d/d, 2,000 gal. in bulk, per gal., 5s 1d.

MANCHESTER: Pure, naked, per gal., 5s 6d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 9d-5s 11d.

INTERMEDIATES AND DYES

(Prices Normal)

***m*-Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.

***o*-Cresol** 30/31°C. D/d, per lb., 1s.

***p*-Cresol** 34/35°C. 10 cwt. lots d/d, per lb., 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra: SP 15°C., per lb., 2s 1¼d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2¼d; SP 66/68°C., per lb., 2s 1d.

***p*-Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots, d/d, per lb., 10d.

Nitroanphthalene. Per lb., 2s 5½d.

***o*-Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.

***p*-Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb., 3s 2d.

Market Reports

Steady Trade for Coal Tar Products

LONDON. Activity in most sections of the industrial chemicals market has been sustained during the past week, and prices for the most part are firm. The demand for hydrogen peroxide, formaldehyde and borax continues at a satisfactory level and there has been no change in the position of the routine soda products and potash chemicals, supplies of which have been moving steadily against contracts. There has been a good seasonal call for fertilisers.

Steady trading conditions have been reported in the coal tar products market. Naphthalene remains in strong request, whilst cresylic acid, creosote oil and crude tar are meeting with a good demand.

MANCHESTER There has been little change of any consequence in trading conditions for heavy chemical products. The alkalis and most other bread-and-butter lines are moving into consumption in good quantities against contract commitments, and additional enquiries from the home section are circulating satisfactorily.

Export business in a wide range of products has been maintained at a ground level to the Commonwealth and other leading outlets. The seasonal demand for compound fertilisers and others is now active.

SCOTLAND In general, conditions on the Scottish heavy chemical market have shown little change during the past week. Home trade demands for industrial chemicals have been active particularly in regard to current requirements. Apart from the usual basic chemicals, demands have covered quite a varied range. The level of demands has also been well maintained in regard to contracts. There is little change in prices to report. The export market is still showing considerable interest.

Arrangements for Coming Conferences on Powders, Carbohydrates and Distillation

THIRTY-TWO papers will be read in four sections at a symposium on 'powders in industry; properties and principles of application', to be held by the Surface Activity Group, Society of Chemical Industry, at the Royal Institution, 21 Albermarle Street, London, on 29 and 30 September. Chairman of the organising committee is Dr. M. G. Fleming of the Bessemer Laboratory, Imperial College.

A symposium sponsored by the Chemical Society on the 'Physical, chemical and biological methods in the study of high molecular weight carbohydrates' will be held in Edinburgh on 12-14 July. Contributors of papers are expected to include Dr. S. A. Barker (Birmingham), Professor E. J. Bourne (Royal Holloway College), Dr. C. T. Greenwood (Edinburgh), Professor E. L. Hirst (Edinburgh), Dr. L. Hough (Bristol), Dr. T. P. Nevell (Shirley Institute), Professor R. D. Preston (Leeds), Professor M. Stacey (Birmingham), Dr. J. R. Turvey (Bangor).

The programme for the International Symposium on distillation, to be held at Brighton on 4, 5 and 6 May, has now been drawn up in detail, and 29 papers from authors in nine countries have been arranged. These will include fundamental distillation problems of heat and mass transfer, vapour-liquid equilibria and performance of tray, packed and other columns; and reprints will be available to registrants even if they are not able to attend. Particulars may be obtained from the Institution of Chemical Engineers, 16 Belgrave Square, London S.W.1.

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TRADE NOTES

Valethene Products

Growing demand for both Valethene drums and tanks has emphasised the need for bringing production and administration under one roof state Metal Containers Ltd., 17 Waterloo Place, Pall Mall, London S.W. The sales and administration products have therefore been moved and the address is now Metal Containers Ltd., Valethene Department, Victoria Crescent, Burton-on-Trent, Staffs.

Furnace Equipment

An illustrated colour brochure describing the company's products is available from the International Furnace Equipment Co. Ltd., Aldridge, Staffordshire.

Vacuum Pumps

The Holmes-Connersville cycloid vacuum pumps, available in a wide range of sizes for producing vacuums up to 27 in. Hg, are described in a leaflet available from the company, W. C. Holmes and Co. Ltd., Turnbridge, Huddersfield.

Continuous Mixing Equipment

A series of illustrated brochures describing the company's continuous mixing and heat transfer equipment is available from Baker Perkins Ltd., West Wood Works, Peterborough. Included are details of machines for handling all combinations of liquids, gases and slurries, and the dissolving of resins in solvents.

New Telephone Numbers

The telephone number of Grosvenor Laboratory, 25 Grosvenor Crescent Mews, London S.W.1, has been changed to Belgravia 7214.

Telephone number of the Gas Council, 1 Grosvenor Place, London S.W.1, is now Belgravia 4321.

U.K. Agents for Heraeus Quartz

Hanovia Lamps Division of Engelhard Industries Ltd., Slough, have been appointed sole U.K. agents for Heraeus Quarzschmelze G.m.b.H., Hanau, West Germany. The Heraeus company manufactures fused quartz in both optical and commercial grades for all industrial and laboratory applications. Heraeus quartz-glass is available in a wide range of sizes as tube or rod, while the optical grades can be furnished as prisms, lenses, blanks, etc.

A wide range of laboratory ware in both transparent and satin silica is offered, and pieces can be made to customers' own patterns. Of particular interest is the Heraeus Bi-distillation apparatus made in two sizes of 0.4 l/h and 1.5 l/h capacity which provide in one operation pyrogen-free, double-distilled water of a degree of purity between 0.55 and 0.9×10^{-6} Siemens/cm.

I.C.I. Dyes and Pigments

Available from the Dyestuffs Division of Imperial Chemical Industries, 81/87 High Holborn, London W.C.1, is a series of leaflets describing new pigments and dyestuffs. These are Chromastral Red RS, a high-stability pigment for industrial stoving and air-drying finishes; Monolite maroon GS, a pigment claimed to overcome fastness problems to bleeding in presence of organic solvents; Procion brilliant orange 2R, a new homogeneous reactive dye for cellulosic fibres, and Procion yellow H3GS, mainly for textile printing in cellulosic fabrics, chlorinated wool and natural silk. This latter has high light and washing fastness and good print paste stability.

Phosphoric Acid Plants

A brochure on the subject of Chemico phosphoric acid plants is now available from Chemical Construction (G.B.) Ltd., 9 Henrietta Place, London W.1. It includes data on fluorine recovery, dicalcium phosphate production, and gas scrubbing systems.

Heat-Stable Polythene Colours

Full details of the colourants best suited for use in Rigidex high density polyethylene are given in Technical Information Sheet No. 7, issued by British Resin Products Ltd., Devonshire House, Piccadilly, London W.1. Also included are methods of assessing the suitability of colourants for use with Rigidex.

New Fast Blue for Paper

Methic Fast Paper Blue 6Gs, introduced to I.C.I. Dyestuffs Division's (Hexagon House, Blackley, Manchester) range of paper specialities, is a homogeneous basic dyestuff that gives brilliant greenish blue shades of very high light fastness when applied to paper. It has excellent fastness to acids, alkalis and to bleaching, making it eminently suitable for high-grade and speciality papers.

New Fluorescent Whitener

The new fluorescent whitening agent introduced by the I.C.I. Dyestuffs Division and referred to in 'Trade Notes,' 12 March, is known as Fluolite MP and not Theolite MP as stated.

Change of Address

Address of Lloyds Instruments Ltd. is now 28 Oak Hill Gardens, Woodford Green, Essex (Buckhurst 2745).

Packaging Equipment

A range of equipment for handling all types of sacks and bags is available from the Thames Packaging Equipment Co., 28 City Road, London E.C.1, all of which can be operated by unskilled labour.

DIARY DATES

MONDAY 28 MARCH

Inst. Rubber Ind.—Manchester: Engineers' Club, Albert Sq., 6.45 p.m. 'Future of polymers', by Dr. L. C. Bateman, E. W. Madge & Dr. W. F. Watson.

TUESDAY 29 MARCH

I.Chem.E.—Manchester: College of Science & Technology. Three-day, symposium on 'Chemical process hazards' with special reference to plant design.

WEDNESDAY 30 MARCH

O.C.C.A.—London: Manson Hse., 26 Portland Pl., W.1, 7 p.m. 'Painting in the petroleum industry', by Dr. H. B. Footner.

Plastics Inst.—London, William Beveridge Hall, London Univ. Senate Hse., W.C.1. Two day conference on 'Polymeric progress'.

THURSDAY 31 MARCH

Fertiliser Soc.—London: Burlington Hse., Piccadilly, W.1, 2.30 p.m. 'Rotary coolers and dryers—some related aspects of design', by S. J. Porter & W. G. Masson.

R.I.C.—Dartford: N.W. Kent College of Technology, 7 p.m. Film show.

R.S.—London: Burlington Hse., Piccadilly, W.1, 4.30 p.m. 'Science in the ceramic industry', by Dr. N. F. Astbury.

S.C.I.—London: Univ. College, Gower St., W.C.1, 9 a.m. Two-day symposium on 'Continuous culture of micro-organisms'.

FRIDAY 1 APRIL

S.C.I.—Manchester: Robinson Lecture Theatre, University, 6 p.m. Manchester section a.g.m., followed by original papers on 'Developments in electrochemical field'.

NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 27 April

Steroid esters and the preparation thereof. Organon Laboratories Ltd. **833 582**

Polymerising unsaturated polyesters. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **833 584**

Preparation of graft polymers. American Cyanamid Co. **833 585**

Recovery of gaseous initial materials of organic chemical reactions from the waste gas. Badische Anilin- & Soda-Fabrik AG. **833 588**

Production of ammonia synthesis feed gas. Texaco Development Corp. **833 551**

Preparation of piperazine. Jefferson Chemical Co. **833 589**

Producing high purity silicon tetrachloride. Sylvania Electric Products Inc. **833 816**

Regenerating Raney nickel and Raney cobalt catalysts. Stamicarbon N.V. **833 592**

Chlorination of alkyl esters of aromatic carboxylic acids. Monsanto Chemical Co. **833 594**

Preparation of pyrrolidyl esters and quaternary compounds thereof. Beecham Research Laboratories Ltd. **833 820**

Preparation of threo-1-nitro-phenyl-2-acylaminopropane-1.3-diols and of their *o*-acyl derivatives acylated in the 3-position. Boehringer & Soehne GmbH, C. F. **833 597**

Process for stabilising organopolysiloxane polymers. Soc. Des Usines Chimiques Rhone-Poulenc. **833 598**

Resolution of monoammonium DL-glutamate. International Minerals & Chemical Corp. **833 823**

Continuous polymerisation of ethylene. Anilin- & Soda-Fabrik AG. **833 604**

Separation tanks for effluents. Terrett, J. F., and Strutt, C. R. **833 605**

Production of finely grained masses consisting mainly of calcium silicate or calcium silicate and silicate acid. Badische Anilin- & Soda-Fabrik AG. **833 607**

2-Acyl-4-amino-phenol ethers and processes for the production thereof. Thomae GmbH., K. **833 826**

Piperazine derivatives. Schinco Ltd. [Addition to 833 473.] **833 474**

Vinyl chloride polymer compositions. U.S. Rubber Co. **833 612**

Production of polyalkalene glycol ethers. Farbenfabriken Bayer AG. **833 610**

Organopolysiloxanes. Midland Silicones Ltd. **833 615**

Stabilised chlorine containing resins. Ferro Chemical Corp. **833 618**

Process for vapour phase nitration. Commercial Solvents Corp. **833 619**

Open to public inspection 4 May

Solvent-extraction of U233 from neutron-irradiated thorium. Honorary Advisory Council for Scientific & Industrial Research. **833 981**

Enriched uranium and compounds thereof. United Kingdom Atomic Energy Authority. **833 982**

Bonding elastomeric materials to rubber. Dunlop Rubber Co. Ltd. **834 233**

Organic polymers and the preparation thereof. Mayer, F. **834 226**

Catalysts for the polymerisation of ethylene and ethylenic compounds. Petrochemicals Ltd. **834 217**

Phenanthridinium compounds. May & Baker. **834 231**

Plastics compositions. British Celanese Ltd. **834 235**

Purifiers for smoke and fumes. Alberti, C. **834 239**

Apparatus for producing pulverulent and/or granular material in flowable form. Henschel & Sohn GmbH. **834 007**

Removal of paraffin waxes from mineral lubricating oils. Empresa Nacional Calvo Sotelo De Combustibles Liquidos y Lubricante S.A. **834 242**

Alumina hydrate compositions and alumina-supported catalysts prepared therefrom. Engelhard Industries Inc. **834 246**

Reducing 3-hydroxypyridine and derivatives thereof. Lakeside Laboratories Inc. **834 248**

Manufacture of aromatic disulphonic acids. Imperial Chemical Industries Ltd. [Cognate application 33 664.] **834 250**

Manufacture of aromatic disulphonic acids. Imperial Chemical Industries Ltd. [Cognate application 33 663.] **834 251**

Extruding alumina hydrate compositions for use in the manufacture of catalyst material. Engelhard Industries Inc. **834 210**

Production of aromatic hydroxy compounds. Farbenfabriken Bayer AG. **834 254**

3-Indolyl aminohydrocarbyl ketones. Upjohn Co. **834 023**

Adiabatic calcination of alumina hydrate. Engelhard Industries Inc. **834 211**

Method of dehydrogenation and catalyst therefor. Phillips Petroleum Co. **834 258**

Apparatus for continuous nitration of toluene by the counter-current method. Dynamit-Actien-Gesellschaft Vorm A. Nobel & Co. **834 260**

Allyl 3, 4-epoxy-2-hydroxyalkanoates and process for preparing same. Union Carbide Corp. **834 029**

Siloxane elastomers. Union Carbide Corp. **834 261**

Thione-thiol-phosphoric acid esters and their production. Farbenfabriken Bayer AG. **834 262**

Manufacture of hydrogen peroxide. National Research Development Corp. **834 264**

Preparation of acrylonitrile. American Cyanamid Co. **834 265**

2-Methyl oxazolidines and 2-methyl tetrahydro 1, 3-oxazines and the preparation thereof. Rohm & Haas Co. **834 266**

Polyorganosiloxane-resin compositions. American Cyanamid Co. **823 269**

Monoazo dyestuffs of the pyrazolone series and their chromium complex compounds. Sandoz Ltd. **823 270**

Separation of the elements zirconium and hafnium. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. **823 271**

Decarboxylation of higher fatty acids. Armour & Co. **834 273**

Process for making acylated leuco-methylene blue. General Aniline & Film Corp. **834 039**

Oxidation of secondary butyl toluene. Imperial Chemical Industries Ltd. **834 274**

Separation of lithium compounds from other compounds. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **834 121**

Benzene recovery from a mixture of a paraffinic and an olefinic feedstock by distillation. Esso Research & Engineering Co. [Addition to 766 276.] **834 276**

Process for working up crude formamide. Leuna-Werke W. Uibricht Veb. **834 278**

1-Aza-(2, 3:5, 6)-dibenzocycloheptadiene derivatives, their acid salts and quaternary salts, and the production thereof. Cilag-Chemie Ltd. **834 281**

Production of boron hydride compounds. Imperial Chemical Industries Ltd. **834 282**

Production of lithium borohydride. Imperial Chemical Industries Ltd. **834 283**

Thiadiazoline sulphonamides and the preparation thereof. American Cyanamid Co. **834 285**

Polyester resin compositions. United States Rubber Co. **834 286**

Promotion of the polymerisation of polyester resins. United States Rubber Co. **834 287**

Substituted piperidines. Imperial Chemical Industries Ltd. **834 290**

Compositions comprising modified polymers of ethylene. Du Pont de Nemours & Co., E. I. **834 291**

Heavy metal salts of diphenolic carboxylic acids. Pittsburgh Plate Glass Co. **834 294**

Promoted carbonylation reaction. Esso Research & Engineering Co. **834 299**

Quinoline derivatives and the manufacture thereof. Wellcome Foundation Ltd. **834 300**

Reduction of oxidic iron ores. United States Steel Corp. **834 042**

Polymers. Du Pont de Nemours & C., E. I. **834 302**

Monoazo dyestuffs containing triazine radicals. Imperial Chemical Industries Ltd. **834 304**

Production of ammonium nitrate. Commercial Solvents Corp. **834 305**

Process for obtaining hydrogen having an increased deuterium content. Becker, E. W. A. [Addition to 803 274.] **834 306**

Oxazoline and oxazine derivatives, polymers, copolymers thereof and method of preparation. Rohm & Haas Co. **834 308**

Substituted 2-thiobenzoxathiols and processes for their preparation. Thomae GmbH, K. **834 310**

Stiffening of polyethylene terephthalate fabrics. Courtaulds Ltd. **834 312**

Manufacture of diquaternary compounds. Wellcome Foundation Ltd. [Addition to 787 279.] **834 313**

Synthetic resins containing titanium and phosphorus and manufacture thereof. Napier & Son Ltd., D. **834 315**

Urea-formaldehyde condensates and adhesives produced therefrom. Ciba (A.R.L.) Ltd. **834 316**

Manufacture of polyethylene. Eastman Kodak Co. **834 317**

Parasiticidal drugs. National Research Development Corp. [Addition to 809 295.[**834 318**

Process for dyeing polyurethane foam. Imperial Chemical Industries Ltd. **834 321**

Radiochemical conversion of light aliphatic hydrocarbons. Esso Research & Engineering Co. **834 323**

Preparation of ferrous sulphate suspensions. British Titan Products Co. Ltd. [Addition to 800 410.] **834 424**

Streptomycin antibiotic copper complex. Pfizer & Co. Inc., C. **834 325**

Organosilicon compounds. Midland Silicones Ltd. **834 326**

Production of foam materials containing urethane groups. Farbenfabriken Bayer AG. **834 328**

Thiophosphoric acid esters and their production. Farbenfabriken Bayer AG. **834 331**

Polymerisation process for ethylenically unsaturated compounds. Imperial Chemical Industries Ltd. **834 332**

Process of producing amyloglucosidase. Staley Manufacturing Co., A. E. **834 334**

Separation of solid materials from gases and vapours. British Titan Products Co. Ltd. **833 875**

(4-Biphenylyl-pyridyl)-carbinols. Francesco Vismara S.p.A. **834 336**

Photopolymerisable compositions and elements containing same. Du Pont de Nemours & Co., E. I. **834 337**

Method of separating lignosulphonic acids from aqueous liquids containing same. Trask Co., A. C. **834 338**

Chemical reaction apparatus. Ethyl Corporation. **834 073**

Fluidised solids town gas manufacturing process. Esso Research & Engineering Co. **834 343**

Gas-liquid contacting apparatus. Texaco Development Co. **834 344**

Preparation of organic isocyanates. General Aniline & Film Corp. **834 082**

Production of cellular vinyl chloride resin compositions. Union Carbide Corp. **834 345**

Impact-resistant synthetic resinous compositions. Badische Anilin- & Soda-Fabrik AG. **834 346**

Water repellent organopolysiloxane compositions for leather. General Electric Co. **834 088**

Modification of olefin polymers. Lubrizol Corp. **834 347**

Production of aliphatic ketones. Armour & Co. **834 348**

Polyamide and polyester extrusion materials. Onderzoekingsinstituut Research NV. **834 350**

Production of inert atmospheres in storage vessels, fuel tanks and the like. British Oxygen Co. Ltd. **833 898**

Surface coatings. Union Chimique Belge SA. **833 899**

Preparation of mixed aldols. Eastman Kodak Co. **834 100**

Esters of thiophosphoric acids containing sulphoxide groups. Farbenfabriken Bayer AG. [Addition to 795 860.] **834 354**

Continuous determination of the quantity of liquid-soluble gas in a gas mixture. Kille, K. T. **833 926**

Stabilised hydrocarbon polymeric materials. Western Electric Co. Inc. **834 355 & 834 356**

Method for preparing carboxylic acid anhydrides, acyl halides and mixtures thereof. Goodrich Co., B. F. **834 357**

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